Factors influencing patient falls in a private hospital group in the Cape Metropole of the Western Cape

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DECLARATION

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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ABSTRACT

Background

The fall rate of patients in hospital settings is a worldwide concern due to the impact falls have on an individual patient, the family or relatives, as well as the healthcare setting. Hospitalised patients have a 12% chance of falling whilst in hospital. Factors involved in patient falls are categorised as intrinsic and extrinsic. Intrinsic factors refers to physical conditions and the extrinsic factors include the environment of the patient, nursing staffing levels and skill mix. Patient fall risk assessments are important measures to prevent falls or minimise the impact thereof.

The aim of this study was to determine the factors that influence patient falls in a private hospital group in the Cape Metropole of the Western Cape. The objectives were to determine the intrinsic and extrinsic factors that contributed to patient falls, to classify the severity of the injuries sustained during patient falls and to determine whether a lack of fall risk assessment by nurses contributed to patient falls.

Methods

A quantitative retrospective descriptive research approach was used. A total of 134 records of patients that have fallen over the timeframe from October 2016–February 2018 were included in the study. Patient documentation and all other relevant information related to the falls were utilised. The data was collected by means of a data extraction sheet and all information was anonymised at the point of collection. The Health Research Ethics Committee (HREC) of the University of Stellenbosch granted a waiver of informed consent. The data was analysed using the SPSS package.

Results

The intrinsic factors that contributed to patient falls were identified as the patient's age, being hypertensive, co-morbidities and the use of benzodiazepines as a sedative.

The extrinsic factors were the incorrect use of the bed rails and the skill mix of the staff. In just over half of the cases (n=68; 50.7%), risk assessments were not performed according to the protocol. Only 5 (3.7%) patients sustained major injuries due to the falls. However, the risk of a more severe fall increased 2.4 times with the lack of risk assessment.

Conclusion

The lack of accurate and consistent patient fall risk assessments, use of benzodiazepines as a sedative and the staff skill mix were contributors to the fall rate in these hospitals. Recommendations include the revision of risk assessment tools to incorporate context-specific factors, adherence to procedures regarding risk assessments as well as auditing the result of these assessments. Attention should be given to current skill mix ratios; an increase in the registered nurse category is proposed to align with international norms.

Key words: Private hospitals, patient falls, intrinsic factors and extrinsic factors.

OPSOMMING

Agtergrond

Pasiënte wat in hospitaal-instellings val, is ’n wêreldwye bron van kommer as gevolg van die impak wat die val op ’n individuele pasiënt, die gesin of familie sowel as die gesondheidsorg-instelling het. Pasiënte het ’n 12% kans om te val terwyl hulle gehospitaliseer is. Faktore wat ’n rol by pasiëntvalle speel, word gekategoriseer as intrinsiek en ekstrinsiek. Intrinsieke faktore verwys na fisiese toestande wat pasiënte ervaar en ekstrinsieke faktore verwys na die area of omgewing waarbinne die pasiënt is sowel as die aantal verpleegpersoneel en die mengsel van verskeie verpleegkategorie-vaardighede. Pasiëntval-risiko-ontleding is ’n belangrike maatreël om te verhoed dat die pasiënte val; dit kan ook die impak van die val verminder.

Die doel van hierdie studie was om te bepaal watter faktore ’n invloed op pasiëntvalle in ‘n privaathospitaal groep in die Kaapse Metropool van die Wes-Kaap het. Die doelwitte was om te bepaal watter intrinsieke en ekstrinsieke faktore bydra tot die pasiënt se val, valle te klassifiseer volgens die erns van die beserings opgedoen tydens die pasiënt se val en om te bepaal of ’n gebrek aan val-risiko-assessering deur verpleegpersoneel bydra tot ’n pasiënt se val.

Metodes

’n Kwantitatiewe, terugwerkende en beskrywende navorsingsbenadering is gebruik. ’n Totaal van 134 rekords van pasiënte wat oor die tydperk vanaf Oktober 2016–Februarie 2018 geval het, is in die studie ingesluit. Pasiëntdokumentasie en alle ander relevante inligting met betrekking tot die val is gebruik. Die data is deur middel van ’n data-ontginningsdokument ingesamel en alle persoonlike inligting is tydens die insamelingsproses verwyder wat die anonimiteit van die data verseker het. Die Gesondheidnavorsing Etiek Komitee van die Universiteit van Stellenbosch het kwytskelding van ingeligte toestemming verleen. Die data is met behulp van die SPSS-sagteware ontleed.

Resultate

Die intrinsieke faktore wat tot pasiëntvalle bygedra het, is geïdentifiseer as die pasiënt se ouderdom, hipertensie, sekondêre siektetoestande en die gebruik van bensodiasepiene as 'n kalmeermiddel.

Verwysend na ekstrinsieke faktore het die verkeerde gebruik van die bedrelings en die vaardigheidsmengsel van die personeel ’n groot bydrae gelewer. In net meer as die helfte

van die gevalle (n = 68; 50.7%) is risiko-ontleding nie uitgevoer volgens die protokol nie. Net 5 (3.7%) pasiënte het ernstige beserings as gevolg van die val opgedoen. Die risiko van ’n meer ernstige val verhoog 2.4 keer by gebrek aan risiko- assessering.

Gevolgtrekking

Die gebrek aan akkurate en konsekwente pasiëntval-risiko-ontleding, die gebruik van bensodiasepiene as ’n kalmeermiddel en die personeelvaardigheidsmengsel was bydraende faktore tot die val-koers in hierdie hospitale. Aanbevelings sluit in die hersiening van risiko evalueringsmiddele om konteks-spesifieke faktore te inkorporeer, nakoming van prosedures met betrekking tot die pasiënt-val-assessering asook die ouditering van die gebruik van hierdie assesseringsdokument. Aandag behoort aan die huidige verhoudinge ten opsigte van die onderskeie vaardighede gegee te word; ’n toename in die geregistreerde verpleegsterskategorie word voorgestel om te voldoen aan die internasionale norme.

Sleutelwoorde: Privaathospitale, pasiëntvalle, intrinsieke faktore en ekstrinsieke faktore

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ABBREVIATIONS

CNS: central nervous system

EN: enrolled nurse

ENA: enrolled nurse auxiliary

RN: registered nurse

CHAPTER 1
FOUNDATION OF THE STUDY

1.1 INTRODUCTION

Nurses are the pillar of the provision of safe and high-quality care and treatment for patients in all healthcare settings. The contribution of nurses to the health and well-being of citizens in any country is immeasurable. From its inception, nursing has centered on the caring of patients, including preventing harm from befalling them. It would be difficult for any healthcare institution to provide nursing care without suitably qualified nursing staff that could prevent complications, can save lives, and can promote patients' well-being. Moreover, such institutions are unlikely to be cost-effective (Armstrong, Reale & Australian Nursing Federation, 2009:3).

According to a study conducted in the United States of America by Kalisch, Tschannen and Lee (2012:6), patients have a 12% chance of falling during a stay in hospital. The authors defined a fall as any event that results in a patient being found on the floor. It includes the unplanned or unintentional lowering of a patient to the ground, in the latter case either by visitors or by staff members. Falls are observed or unobserved, often also distinguished as assisted or unassisted falls. An assisted fall occurs in the presence of a staff member who eases or assists the patient to the ground. An unassisted fall occurs when a patient is alone and no one else is present (Staggs, Mion & Shorr, 2014:358) to observe the fall or assist the patient.

The Sentinel Event Alert (2015:1) by the Joint Commission for Accreditation stated that the factors that most frequently contribute to patient falls are the following:

(i) inadequate assessment of patients and communication failures;
(ii) staff not following procedures and safety measures;
(iii) deficiency in staff orientation, supervision, leadership, and in the level of staffing skill mix; and
(iv) the physical environment surrounding the patient.

Kalisch *et al*. (2012:6) included the patient's age and acuity, diagnosis, medication and treatment plan, as well as the layout of a unit where a fall occurs as factors contributing to patient falls.

When a patient sustains an injury as a result of a fall, litigation against the hospital becomes a possibility. This can result in withholding of payment by funders, which in turn produces a

financial loss for the institution (Kalisch *et al*., 2012:6). Because of the negative impact that patient falls have on an organization, the need to determine the factors that contribute to patient falls is very important. The role of a nurse in preventing patient falls should be monitored closely (Staggs & Dunton, 2013:87).

1.2 BACKGROUND AND RATIONALE

According to a study conducted by Bouldin, Andresen, Dunton, Simon, Water, Liu, Daniels, Mion and Shorr (2013:1), fall rates in hospitals in the United States range from 3.3 to 11.5 falls per 1 000 patient days. The authors differentiate between various hospital units, reporting that fall rates are often higher in neurosurgery, neurology and in medical units in comparison with lower rates in surgical and intensive-care units. During their study, they found that the rate for falls with serious injuries was 1.08 per 1 000 patient days. They were unable to discern any association between falls and staffing levels or between falls and hospital size (Bouldin *et al.*, 2013:5).

Groutas and Staggs (2014:40) noted that the international benchmark for patient falls range from 2.3 to 7 falls per 1 000 patient days. This accounts for approximately 700 000 to 1 000 000 falls per year in the United States. More alarming is the estimate that annually more than 1% (11 000) of these falls are fatal. Unassisted falls inevitably lead to more serious injuries than assisted falls, thus causing greater harm to the patient such as serious fractures or sprains, or even fatal injuries (Groutas & Staggs, 2014:41).

Due to the falls benchmarking model (Emergency Care Research Institute (ECRI) 2016:13) various facilities can be compared with one another. This is possible because of the formula used to calculate patient fall rate:

$$\frac{\text{Number of patient falls}}{\text{Number of patient days}} \text{ X } 1\,000$$

This represents all falls, including multiple falls by the same patient. It is advisable to compare each institution with its own fall history since facilities differ with regard to risk factors such as layouts, patient profiles, and other causative factors (Emergency Care Research Institute, 2016:14). Injuries following falls can be categorized as depicted in Table 1.1.

Table 1.1: Categories of injuries due to patient falls

Category	Description
None	No injury to a patient after the fall
Minor	Application of a dressing, limb elevation, pain relief or attending to bruising
Moderate	Possible suturing, or applying a splint or bandage due to a sprain
Major	Surgery and/or casting due to a fractured limb, skull (including subdural hematomas), ribs or any laceration including a rupture of the liver
Death	Succumbing to the injury following the fall

(Emergency Care Research Institute, 2016:13 – 14)

The researcher has observed that in the two hospitals of a private hospital group in the Cape Metropole of the Western Cape, South Africa, patient falls (both assisted and unassisted) constitute a key factor relating to negative patient outcomes. The current benchmark for falls in the hospital group is 0.65 per 1 000 patient days. The actual rate varies from 1.1–1.8 per 1 000 patient days

Despite the use of international best practices and evidence-based procedures, the fall rate with and without serious injuries remains a concern. Various assessment tools are available and the hospitals in this study made use of the Hendrich II Fall Risk Assessment tool. This will be discussed in more detail in Chapter 2. According to this tool, a patient with a score higher than five (5) is considered to be at serious risk of falling (Hendrich, 2007:1).

Despite the use of this tool in the hospitals and the calculation of staffing (including numbers and skill mix) patients continue to fall, resulting in injuries and prolonged hospitalization. In the context of this study, the categories of nurses in the skill mix include registered nurse, enrolled nurse, and enrolled nursing auxiliary. A non-nurse category, care worker, also forms part of the skill mix. In general units the percentage registered nurse is 25%, enrolled nurse 35%, and nursing auxiliary 40% per shift.

The reasons for patients' falls are usually explained in terms of intrinsic or extrinsic risk factors. Intrinsic factors concern a patient's actual physical condition, while extrinsic factors relate to the environment in which a patient is situated. They include nursing staffing levels and skill mix and are modifiable (Emergency Care Research Institute, 2016:16).

No studies could be found on the risk factors associated with patient falls in acute hospital settings in South Africa.

1.3 PROBLEM STATEMENT

Two private hospitals from the same private hospital group were selected for this study. Both used an international evidence-based assessment tool (Hendrich II) to assess a patient's risk of falling. This tool only assesses intrinsic risk factors for falling. Despite utilizing this tool and assessing patients according to appropriate procedure, the hospitals have a fall rate of 1.1 and 1 per 1 000 patient days respectively. This equaled 155 falls over a 17-month period. The primary focus of this study was to determine the factors that influence patient falls despite the necessary preventive measures being in place.

1.4 RESEARCH QUESTION

What are the factors influencing patient falls in a private hospital group in the Cape Metropole of the Western Cape?

1.5 AIM OF THE RESEARCH

The aim of this study was to determine the factors that influence patient falls in a private hospital group in the Cape Metropole of the Western Cape.

1.6 RESEARCH OBJECTIVES

The objectives of this study were the following:

- To determine the intrinsic factors that contribute to patient falls
- To determine the extrinsic factors that contribute to patient falls
- To classify the severity of the injuries sustained during patient falls, and to
- To determine whether failure by nurses to conduct fall-risk assessments contributes to patient falls.

1.7 CONCEPTUAL FRAMEWORK

The quality health outcomes model described by Mitchell, Ferketich and Jennings, (1998:43) is based on the linear model of the Donabedian Framework of 1966. This linear model implies structural and client characteristics, processes and outcomes. The Donabedian model has been generally accepted when quality standards in healthcare are developed (Haj, Lamini & Rais, 2013:17). In the Donabedian model, the concept of **structure** refers to the fixed characteristics of the staff (including staffing levels), the patient profile, including age, gender, physical and mental status, as well as their acuity levels. "Structure" also includes all the factors that affect the context in which care is delivered. They include the physical facility, equipment and human resources, as well as organizational characteristics such as staff training and payment methods.

Usually the patient is not included in this model (according to the original model), although according to the literature, Haj *et al.* (2013:20), the patient's characteristics are added as part of the structure. These characteristics have a major influence on a patient's risk of falling and are referred to as intrinsic factors in the conceptual framework.

"Environment" refers to equipment and safety strategies (Haj *et al.*, 2013:20). "**Process"** refers to the activities that should be performed when a patient is being cared for. Such activities include use of aspects of medical science and technology, as well as interpersonal aspects between the patient and the nurse (Haj *et al.,* 2013:20).

"Outcomes" are the measurable consequences of an intervention. They include improvement in a patient's condition and determining whether the goals of the care intervention have been achieved or exceeded (Haj *et al.*, 2013:21). The Donabedian model has been selected as the conceptual framework for this study as per table 1.2.

Table 1.2: Conceptual Framework Model adapted from the quality health outcomes model

Structure – factors inducing patient falls	
Intrinsic factors	**Extrinsic factors**
✓ Patient profile including age, gender ✓ Patient acuity levels ✓ Mobility – previous falls, posture, any disorders of the muscular skeletal system, assistance required ✓ Urinary irregularities, including altered elimination habits ✓ Visual and perceptual disturbances ✓ Postural hypotension ✓ Mental disturbances, including not limited to, dementia and delirium ✓ Medications – anti-epileptics, benzodiazepines ✓ Any medication suppressing the central nervous system ✓ Co-morbidities	✓ Environmental factors, including uneven or wet floors, height of a toilet seat and faulty assistance devices ✓ The call bell or bed alarm ✓ The height of the bed and use of bed rails ✓ The unit size ✓ Furniture arrangements in the wards ✓ Poorly fitting shoes and loose clothing worn by a patient ✓ Incorrect staffing levels and skill mix ✓ The time of the falls ✓ Assessment of the patient and orientation in the unit
Process	
Nursing interventions, including conducting risk assessments	
Outcomes	
Reduced patient falls, both assisted and unassisted Reduction of serious injuries associated with the falls	

(Haj *et al*., 2013:20)

1.8 RESEARCH METHODOLOGY

1.8.1 Research design

A quantitative research approach utilizing a retrospective descriptive study design was selected for this study. Patient documentation and all other relevant information relating to the falls were accessed and the information they contained was used as source of data for this retrospective audit. Descriptive designs are useful in nursing studies since they provide a clear picture of what is happening in a specific area. In a descriptive study it is impossible to manipulate the variables (Grove, Burns & Gray, 2013:215).

1.8.2 The research setting

The study was conducted in two private hospitals belonging to the same group in the Cape Metropole (see section 1.3 above). Private health care refers to medical services provided by an entity other than the government. Such services are paid for by patients themselves unless they have access to a medical aid scheme or health insurance (Republic of South Africa, 2004:14). The two hospitals selected are classified as large hospitals, each having more than 200 beds.

Hospital A has 250 acute beds in general surgical, medical, cardio- and neurosurgery, orthopaedic, paediatric, maternity and intensive-care units, as well as high-care units. The catchment area for this hospital embraces the entire Cape Metropole since this is a complex facility that offers all the medical disciplines. Patients are referred there from across the region. Moreover, a number of retirement villages and frail-care centers are located in the areas surrounding the hospital resulting in the admission of elderly patients into hospital A.

Hospital B has 200 beds in medical wards, various surgical wards, including vascular, general and gastro-intestinal surgery, paediatric wards, maternity wards and intensive-care units. The catchment area for this hospital is predominantly the Southern suburbs and surrounding areas. In my prior position in this company, it was my experience that this area is populated by younger, more vibrant communities and the hospital has a busy maternity and neonatal unit.

The selection of these two hospitals from the same private group could constitute a limitation as regards generalization of factors influencing patient falls, but because of time constraints facing the research, the study was delimited to these two hospitals.

1.8.3 Population and sampling

In the private hospital group, there are only two hospitals situated in the Cape Metropole of the Western Cape. Both hospitals from the same group in the Cape Metropole were selected. The target population included all adult patient falls for the period 1 October 2016 to 28 February 2018, which constituted a total of 155 falls. Fifteen files were not accessible because of filing errors and incomplete nursing notes at the time of data collection. Six (6) other folders were excluded from the study since they concerned patients in a paediatric and neonatal unit. Due to different risk factors and risk assessment tools, the paediatric and neonatal falls were not included. The final population accessed was 134.

1.8.4 Instrumentation and data collection

A data-extraction sheet designed by the researcher (Appendix: 3) formed the instrument used for data collection. Its design was guided by information in the ECRI study on falls (Emergency Care Research Institute, 2016), as well as the Hendrich II assessment tool (Hendrich, 2007:55).

1.8.5 Pilot test

A pilot test involving the selected hospitals was conducted for this project before the actual research commenced to identify any problems with the data extraction sheet. Ten (10) conveniently selected cases were reviewed, four from hospital B and six from hospital A. All cases occurred in the two months preceding the study period selected (August and September 2016). The reason for selecting six cases from hospital A and four cases to hospital B was due to hospital A having a higher fall rate than hospital B. According to Okeke and van Wyk (2015:330), a small representative sample is selected to complete the pilot test to determine the accuracy of the tool in terms of measurement of information. Since no problems with the data extraction form were identified, the researcher did not see the need for selecting more cases. This data was not included in the final results of the study.

1.8.6 Validity and reliability

The researcher utilised the data from the various sources at the two hospitals. All incident reports as well as electronic severity reports were used as sources of information. The actual patient record was accessed to assess the completion of the assessment tools, and the medication charts were perused to determine the time of medication administration. The nursing delegation lists available in the units included the patient numbers as well as acuity levels daily required to complete the study.

1.8.7 Data analysis

A statistician and the supervisor at Stellenbosch University assisted with the analysis of the captured data. The *Statistical Package for the Social Sciences* (SPSS), version 25, was used to analyze the data (IBM Corp, 2017).

1.9 ETHICAL CONSIDERATIONS

A researcher has the ethical responsibility to protect the human rights of the patients involved in a study. Since the study used a retrospective descriptive study design (see section 1.8.1 above), patients' consent to participate in the study could not be obtained because they had all been discharged by the time the study commenced. Consequently, a waiver of informed consent was granted by the Health Research Ethics Committee (HREC).

Ethical approval was obtained from the HREC of Stellenbosch University (HREC reference # s18/05/097) prior to the commencement of the study (appendix: 1). Thereafter, the research proposal was submitted to the ethics committee of the private hospital group for further approval and to obtain permission to conduct the study in the selected hospitals (reference 251015-048; appendix: 2).

1.10 OPERATIONAL DEFINITIONS

A **patient's acuity** refers to the severity of his or her illness or disease (Huber, 2010:504). This is measured in terms of the specific treatment that a patient requires to which a numerical value or score is then ascribed. Aspects of a patient's basic needs, his or her medical treatment or condition, and the type of care he or she requires are considered in the calculation of this score. The hospital group concerned applies a specific set of criteria to determine the levels of acuity. "Major" refers to a score greater than 20, "moderate" to a score between 9 and 19, and "minor" to a score between 0 and 8 (Cronje, 2016:9).

An **adverse event** refers to an unintentional injury or complication that can result in injury, disability or death (Considine & Boti, 2004:21).

As mentioned previously (see section 1.1 above), **assisted falls** occur in situations where a staff member is present to ease or assist a patient's fall to the ground (Staggs *et al.*, 2014:358).

A **care worker** is defined as someone with six to eight weeks of training, predominantly offered by colleges not affiliated to nursing schools. Such training focuses on patients' basic needs and aims to equip a student to be able to provide care in a home-based environment.

This category of care is not regulated by the South African Nursing Council (Aylward, Crowley & Stellenberg, 2017:2).

Co-morbidity refers to the coexistence of other diseases besides the admission diagnosis at the time of admission (Kane, Shamliyan, Mueller, Duval & Wilt, 2007 (a):15).

An **enrolled nurse** has completed a two-year certificate course at a nursing school affiliated to either a nursing college or a university (Armstrong, Bhengu, Kotzé, Nkonzo-Mtembu, Ricks, Stellenberg, Van Rooyen & Vasuthevan, 2013:95). According to the Regulation R2598 as promulgated through the Nursing Act 50 of 1978 (Republic of South Africa, 1984:5), an enrolled nurse follows the acts and procedures as part of the nursing regimen planned and initiated by registered nurses or registered midwives and carry these out under their direct or indirect supervision.

Enrolled nursing auxiliary is a nurse with a one-year certificate obtained from a nursing college (Armstrong *et al*., 2013:95). According to the Regulation R2598 as promulgated through the Nursing Act 50 of 1978 (Republic of South Africa, 1984:5), the scope of practice of an enrolled nursing assistant entails acts and procedures as part of the nursing regimen planned and initiated by registered nurses or registered midwives and carry these out under their direct or indirect supervision.

Length of stay (LOS) refers to the period a patient remains in hospital (Kane *et al.,* 2007(a):14).

Nursing skill mix refers to the proportion of productive hours (i.e. direct patient care-related) worked by each skill mix category (Kane *et al.*, 2007(a):14).

As mentioned above (see section 1.1 above), a **patient fall** refers to an event in which a patient is found on the floor, due to a fall from either a bed, chair or while walking. Such incidents may be observed or unobserved (Kalisch *et al*., 2012:6).

A private hospital is an entity that provides private healthcare services and is distinguished from state-owned entities (Republic of South Africa, 2004:14). (Also see section 1.8.2 above).

A **registered nurse** refers to a nurse (general, psychiatric and community) and midwife that will be registered as a nurse after completion of training as stipulated by the South African Nursing Council. (Armstrong *et al*., 2013:95). A professional nurse is a person who is qualified and competent independently practise comprehensive nursing in the manner and to the level prescribed and who is capable of assuming responsibility and accountability for

such practice according to the new Nursing Act 33 of 2005 (Republic of South Africa, 2005:25).

An **unassisted fall** occurs when no-one is present to ease the fall (Staggs *et al.*, 2014:358). (Also see section 1.1 above.)

1.11 DURATION OF THE STUDY

Ethical approval and institutional approval to conduct the study were received in June 2018 and July 2018 respectively. The pilot test was conducted at the end of July, followed by the collection of all the data required for the study in August 2018. Data analysis took place during September 2018. The dissertation was finally submitted in November 2018.

1.12 CHAPTER OUTLINE

Chapter 1: Foundation of the study

Chapter 1 defines the background and rationale of the study. It states the research problem and research objectives. Furthermore, it provides an overview of the methodology of the study. Ethical issues pertaining to the study also received attention.

Chapter 2: Literature review

Chapter 2 provides an in-depth review of available literature regarding factors involved in patient falls.

Chapter 3: Research methodology

This chapter discusses the research design and methodology used in this study.

Chapter 4: Results

Chapter 4 discusses the analysis and interpretation of the data captured during the research.

Chapter 5: Discussion, conclusions and recommendations

In this chapter the results and the extent to which the research objectives have been met are discussed. Conclusions and recommendations are offered.

1.13 SIGNIFICANCE OF THE STUDY

This research study provided valuable information about and reasons for patients' falls in two private hospitals in the Western Cape. Since the factors that influence patient falls in the specified hospitals have been identified, additional preventative measures can be put in place to reduce the number of falls and to prevent injuries.

1.14 CONCLUSION

Patient falls in hospitals remain a concern. In this study, factors that influence patient falls in a private hospital group in the Cape Metropole of the Western Cape were determined. The determining factors can now be used to establish preventative measures in a quest to reduce patient falls, hospital liability, as well as the distress caused to patients involved in the falls. The next chapter offers an in-depth review of the literature available on patient falls.

CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

Chapter 1 laid the foundation for this study by describing its background and rationale; identifying the research problem and objectives, and presenting the conceptual framework used in the study. In Chapter 2, the available national and international literature that deals with patient falls in that is in line with this study's conceptual framework, is discussed according to the studies' structure, process and outcomes.

The review is based on literature available on different databases. The importance of conducting an in-depth literature review is associated with the need to understand the topic in question, and to contribute to scholarly developments in the chosen area of research (Botma, Greeff, Mulaudzi & Wright, 2010:63).

The ECRI (Emergency Care Research Institute, 2016:1) described patient falls as "high-volume, high risk, high-cost for healthcare facilities" throughout the world. Besides the actual cost of the falls arising from injuries sustained by patients, patient falls mean additional costs for facilities since measures must be put in place to prevent falls.

2.2 SELECTING AND REVIEWING THE LITERATURE

A literature review entails a process of finding, critiquing and analyzing relevant research reports and articles pertaining to a selected field of study. It also provides the background for the proposed study (Grove, Gray & Burns, 2015:175). However, to be of value, articles and reports should be relevant, not older than ten years, and broad enough to cover all aspects of the proposed study. Included in this study were some articles of relevance that were older than 10 years due to the unavailability of more recent studies.

The electronic databases, PubMed, CINAHL, Science Direct and Google Scholar, were accessed and perused for relevant articles. Key words used in the search for sources included "nurse staffing", "nursing skill mix", "nurse/patient ratios", "adverse events", "patients' sensitive outcomes", "assisted and unassisted falls", "risk assessment tools", and "patient ergonomics".

2.3 PATIENT FALLS: A SAFETY RISK

Hospitalization increases the risk of falling for all ages. However, the risk may increase with age (Watson, Salmoni & Zecevic, 2015:84). A study conducted in Canada has shown that elderly and frail persons who have more than one co-morbidity have a greater risk of falling (Watson *et al.*, 2015:84).

Patient falls remain a major problem in acute hospitals and have devastating effects on patients as well as their families (Dykes, Carroll, Hurley, Benoit & Middleton, 2009:299). For patients the experience of being in an unfamiliar environment, the need to cope with illness, surgery, bed rest, medications and other forms of treatment and invasive procedures such as insertion of a catheter, intravenous line drains and other tubes, all increases the risk of falling (Dykes *et al.*, 2009:299). This was confirmed in a study by Kalisch *et al*. (2012:6) showing that patients are affected psychologically when admitted to hospital and are often overwhelmed by the news of their disease or by a diagnosis. Besides a diagnosis, a patient's mobility is also often affected by treatment plans.

A fall can result in a downward spiral in patients' well-being or comfort levels because they might develop a fear of falling. This leads to reduced mobility, which in turn, facilitates functional loss (Dykes *et al.*, 2009:299). Despite the urgency in all hospitals in the United States to ensure that patients do not come to any harm, patient falls continue to occur. Medicare, an organization that provides insurance payment for hospitalization, will not pay or reimburse a hospital for costs that are fall-related (Dykes *et al.*, 2009:300). Kalisch *et al*. (2012:6) noted the same about payment and reimbursement of accounts, and therefore suggested that the focus should first be on determining the causes of falls and then on preventing them.

A review of articles and other forms of literature obtained from MEDLINE (1966–2008) and CINAHL (1982–2008) revealed that although there is adequate information on fall-risk assessments, there is no conclusive evidence regarding intervention and fall-prevention programmes (Dykes *et al.*, 2009:300). In their study on patient falls, Rush, Robey-Williams, Patton, Chamberlain, Bendyk and Sparks (2008:357) found that despite nurses' familiarity with and knowledge of patients' risks of falling, risk assessments and the evaluation of fall-prevention programmes, patients continue to fall in hospitals.

Since nurses are the primary caregivers in a hospital, they are most affected by patient falls. Some nurses report that falls violate their legal and ethical responsibility not to cause any harm to a patient (Rush *et al.*, 2008:358). Falls can undermine the quality of the nurse-patient relationship when nurses, who are expected to know a patient's fall risk, allow

patients to fall (Rush *et al.*, 2008:358). Conflicting ideas between nurse and patient regarding the level of care that is needed, as well as a lack of assessment of their risk of falling, often lead to patient falls. A patient may feel that there is no need to call for assistance, while the nurse expects a patient to call for assistance (Kalisch *et al*., 2012:11).

2.3.1 The prevalence of falls

As noted previously (see section 2.3 above), worldwide patient falls in hospitals occur regularly and are an ongoing challenge to health providers despite corrective interventions. In a Canadian study conducted by Watson *et al.* (2015:84) the fall rate in a hospital was 4.48 per 1 000 patient days for the first three years of the study and then decreased to 4.40 for the remainder of the study period. The reduction in falls was only marginal, despite preventive measures and actions being implemented. Falls that occurred in the medicine, surgery and neurosciences programmes represented 65% of all the falls that were reported. The fall rate was 6.12 per 1 000 patient days in these units. This compared well with the other studies the authors monitored (Watson *et al.*, 2015:88). The most prevalent time for the falls was between 01:00 and 02:00; 10:00 and 12:00, and between 16:00 and 17:00. The study found that 72% of the falls occurred in the patients' rooms and were associated with physical activity such as walking to the bathroom. The authors also found that unsteady gait, failure to ask for assistance, weakness, and impaired balance were the main contributors to patient falls. Physical decline and age put patients at a higher risk of falling and thus of sustaining injuries (Watson *et al.*, 2015:89).

In a study conducted in 2002 by Hitcho, Krauss, Birge, Dunagon, Fischer, Johnson, Nast, Costantinou and Fraser (2004:732) in the 1300-bed academic Barnes-Jewish Hospital, associated with the Washington University School of Medicine, the average age of patients who fell was 63.4 years. The study indicated that most of the falls were unassisted and occurred in the patients' rooms during the evening when they were physically active. Furthermore, approximately half of these falls were patient elimination related. Indeed, the fact that patients failed to ask for assistance during elimination-related activities contributed to a high percentage of the falls. Although the average age of the patients who fell was high, the study reported that young people (aged 17 years) also fell. In their study, the authors found that complex patient characteristics and circumstances, as well as activities such as patient weakness, poor cognitive status, and certain medications that adversely affect a patient might have contributed to the falls (Hitcho *et al.*, 2004:737). The study also showed that most patients fell while getting into or out of bed. The ECRI reported a high incidence of falls amongst patients older than 65 years. Approximately 30–50% of the patients who fell suffered some form of injury (Emergency Care Research Institute, 2016:5).

Hitcho *et al.* (2004:738) pointed out that the nurses' assessments of patients' mental status, i.e. orientation in terms of place, person and time, were not always conducted consistently, and that some patients might have been wrongly classified as minor, moderate or major in terms of the care they required.

Bouldin *et al.* (2013:2) mentioned that the fall rate in a study they conducted in hospitals in the United States ranged between 3.3 and 11.5 per 1 000 patient days, depending on the department unit in which they occurred. They also referred to neurosurgery, neurology and medical units as having higher fall rates than other units. Bouldin *et al.* (2013:2) also commented on an increase in the length of stay in hospital due to the seriousness of injuries sustained during falls. Patients could spend 6 to 12 days longer in hospital, with an additional cost of approximately $13 316 per stay. However, most falls did not result in any injury to the patient. One in ten falls resulted in moderate injuries; fewer than one in twenty falls were reported to have produced major injuries, and two in one thousand falls resulted in death (Bouldin *et al.*, 2013:5). In the literature discussed above, the outcomes and rates of patient falls are the same. No comparative data was available for South African hospitals.

2.3.2 Intrinsic and extrinsic factors contributing to falls

A report by The World Health Organization (WHO) (2007:4) indicates that patient falls are a worldwide concern for all healthcare institutions. As in other studies, the WHO report also stated that the average age of patients who fell was 65 years, and the rate of falls increased with frailty among patients.

The WHO (World Health Organization, 2007:4) classified fall risk into four categories of factors, namely biological, behavioral, environmental and socioeconomic.

a) Biological factors include age, gender and race. With aging, cognitive ability is reduced, the incidence of co-morbidities increases, and muscle strength is reduced.
b) Behavioral factors include people's actions, emotions and the daily choices they exercise. These include the medication people take, excessive alcohol intake (not necessarily in hospital), and any other factors that might alter the behavior of individuals.
c) Environmental factors include the surroundings, hazards, uneven or slippery floors, and poor lighting.

d) Socioeconomic factors include income, education, inadequate housing, lack of social interaction, and limited access to health- and social-care facilities.

According to Feil and Gardner (2012:73), the interplay between intrinsic factors and extrinsic factors increases patients' risk of falling.

2.3.2.1 Intrinsic factors

Intrinsic factors that influence patients' falls concern their physical condition (Emergency Care Research Institute 2016:16; Hignett & Masud, 2006:607). These are factors that are inherent within an individual and can be acute or chronic, or due to medication use.

Hignett and Masud (2006:607) identifies the age of 65 years and above, a previous history of falls, poor posture and balance deficiencies as intrinsic factors that influence patient falls. Medical conditions such as cardiovascular disease, post-stroke problems, epilepsy and elimination-related diseases are also mentioned in the literature. Elimination refers to urinary irregularities such as a frequent desire to urinate and incontinence (Hignett & Masud, 2006:607).

Medications that influence the intrinsic fall factor are anti-epileptics, benzodiazepines and other central nervous system depressants. Postural hypotension, as well as use of prescribed medications that can be associated with lowering blood pressure, influence patients fall risk (Emergency Care Research Institute, 2016:16). Foot disorders, musculoskeletal or degenerative disorders of the spine, as well as gait or balance disturbances can lead to falls if patients do not ask for assistance (Hignett & Masud, 2006:607).

Visual disturbances, including a lack of light sensitivity, as well as loss of hearing are intrinsic factors that can lead to falls. Changes in mental state, for example, dementia and depression, vertigo and dizziness are some of the other main contributors to falls (Emergency Care Research Institute, 2016:16). Watson *et al.* (2015:86) confirmed the influence of intrinsic factors on falls in their study. They identified an unsteady gait (12%), failing to call for assistance (12%), a history of previous falls (10%), weakness (9%), and impaired balance (8%) as factors contributing to falls.

2.3.2.2 Extrinsic factors

Extrinsic factors refer to

(i) environmental factors such as handrails, the height of toilets, uneven or slippery floor surfaces;

(ii) furniture, including loose carpets, equipment with unsecured wheels and the height of a bed;
(iii) the type of shoes and loose-fitting clothing worn by patients;
(iv) staff training and education levels;
(v) the specific time of a fall; and
(vi) distracting noises and attachments such as monitors and invasive lines (Emergency Care Research Institute, 2016:16).

Hignett and Masud (2006:605) reviewed the ergonomics of patient falls that concerned environmental risks that contributed to patient falls. In their study they also mentioned intrinsic and extrinsic factors. Similar to the definition provided by the ECRI, Hignett and Masud regarded intrinsic factors as the specific qualities of a patient and his or her disease profile, while extrinsic factors refer to social and physical factors that contribute to the fall risk (Hignett & Masud, 2006:618).

Environmental factors that might contribute to patient falls include the height of the bed and the use of bedrails. Hignett and Masud (2006:609) reported that between 37%–90% of falls occurred when the bedrails were pulled up. No evidence could be found to support the use of the bedrails. In fact, using the bed rails was said to cause an increase in the severity of injuries sustained by a patient during a fall (Hignett & Masud, 2006:609). Available evidence suggests that it is safer to lower the bed to a height where a patient can touch the ground rather than to use the bedrails (Hignett & Masud, 2006:609). Concerning attachments, there is no clear evidence that attachments such as intravenous lines, electrocardiogram cables and other equipment play a role in falls.

In their study about the environment and causes of falls, Pati, Valipoor, Cloutier, Yang, Freier, Harvey and Lee (2017:1) found that the physical configuration of the bathroom, toilet seat height and doors play a role in patient falls. The furniture and equipment within the room including the intravenous line stands, the chairs and overbed trolleys also contributed to the falls. In their study they used video clips to determine the movements and posture of patients during the fall. Pati *et al.* (2017:1) recommended that the factors as mentioned be addressed to reduce the possibility of falls. These factors are echoed in the study by Brewer, Carley and Benham-Hutchins (2018:1) that the design and layout of nursing units plays a part in patient falls.

Hignett and Masud (2006:609) found that for a small percentage of patients, falling was the result of wearing slippery footwear. Lighting in hospitals is not always designed to brighten the flooring and this can often lead to falls (Hignett & Masud 2006:610). The design of the unit, marking of areas and doorways are also factors that could contribute to falls (Hignett & Masud, 2006:609). Uneven flooring and slippery surfaces can also play a role in patient falls. Patient assessment is a major contributing factor to falls. Sometimes nursing staff do not complete assessments correctly or have not been trained properly to complete an assessment, and thus lack insight into an assessment and its results, which in turn, can contribute to patient falls. Hignett and Masud's (2006:610) review revealed that only between 52% and 71% of patients had been assessed.

A significant conclusion reached by Hignett and Masud (2006:613) is that assessment tools should include both intrinsic and extrinsic factors to reduce the risk of patient falls. A history of previous falls up to one year prior to admission is also a determining factor in assessing fall risk. From an ergonomic perspective, the patient should be placed in the center and then the risk of falling is assessed from that point. The environment should be designed so that the risk of falling is reduced. This could include the use of a split bedrail to assist with patient movement in the bed or placing a mobility aid or a device in close proximity to the patient. The height of the bed, which plays an important role in the injuries sustained by patients, should also be such that a patient can touch the ground, i.e. approximately 30 cm from the ground.

2.3.3 Patient falls, nursing staff levels and skill mix

Nursing staff are central to ensuring that risk assessments are performed. However, their level of training, the number of staff on duty, and the skill mix may influence how effectively these risks are assessed and managed. When nursing assessments, inclusive of fall risk and general assessments are done accurately, it is often unnecessary to increase staffing levels, since the correct standard of care can be provided with the correct acuity levels of the patients. It is, therefore, more important to develop or create reminders for nursing staff to complete assessments timeously, rather than to increase staff levels. This should be done on each shift change to determine the level of care needed and for the unit to be adequately staffed (Kalisch *et al*., 2012:7). Hendrich (2007:52) supports the assessments being done on admission as well as with each change of shift.

Nursing skill mix refers to the proportion of productive (i.e. direct patient-care related) hours worked by each skill mix category (Kane *et al.*, 2007(a):14). Patient to nurse ratios, alternatively called staffing levels, refer to the number of staff members in various categories of nursing in relation to the number of patients they care for (Kane *et al.*, 2007(a):14).

According to Groutas and Stagg (2014:47), registered nurses play an important role in understanding and preventing unassisted falls. If such falls can be prevented, patient outcomes will be improved, and the length of hospital stay will be reduced. Increasing the number of registered nurses may be a way of achieving better patient outcomes.

Kane, Shamliyan, Mueller, Duval and Wilt (2007(b):1195) conducted a systematic review consisting of a meta-analysis of 96 studies of hospitals randomly selected across the United States. The review showed that restructuring hospitals to incorporate managed health care and diagnosis-related care shortened the duration of hospitalization of acutely ill patients, which in turn, increased the pressure on nursing staff to provide safe nursing care. This resulted in an increase in the nurse-patient ratio.

The only state in the United States with regulated nurse-patient ratios is California. Despite regulating nurse-patient ratios, no significant improvement was noted in patient outcomes (Kane *et al.*, 2007(b):1202). Although skill, education, experience and leadership are all factors involved in improved nursing outputs, assessing such traits proves to be difficult. With the worldwide shortage of registered nurses, an alternative method of improving nursing outputs needs to be implemented. Consequently, the patient acuity tool is used to calculate the need for registered nurses per shift. This however, is also problematic in that during a shift, patients' needs could change but not so the number of registered nurses on duty (Kane *et al.*, 2007(b):1202). The review by Kane *et al.* concluded that there are significant associations between the number of registered nurses and patient outcomes.

Aiken, Sloane, Griffiths, Rafferty, Bruyneel, McHugh, Maier, Moreno-Casbas, Ball, Ausserhofer and Sermeus (2016:1) conducted a cross-sectional study in Europe that included six countries, namely, Belgium, England, Finland, Ireland, Spain and Switzerland. The results of this study showed that when more professional nurses are used in the skill mix, a decrease in mortality rates and adverse events, as well as less negative feedback from patients, were recorded. The authors found that when lower categories of staff are replaced by registered nurses, the costs associated with adverse events drops. The study also found that with higher skill levels, the staff is less likely to experience burnout, nurse retention improves, and adverse events decrease (Aiken *et al.,* 2016:7).

Such factors were also noted in an earlier study from April 1998 to November 1999 undertaken by Aiken, Clarke, Sloane, Sochlaski, Jennings and Silber (2002:1987). Their study focused on the association between the nurse-patient ratio and patient mortality; deaths following complications; and matters pertaining to the retention of nurses. The value of nurse observations of their patients was affected by the number of registered nurses on a

shift. This is an important factor in explaining variations in patient mortality and adverse events in hospitals.

Aiken *et al.* (2016:8) also showed that an increase of 10% in the number of professional nurses in the skill mix is equal to a decrease of 11% in patient mortality and the incidence of adverse events. Adverse events can be patient falls, pressure ulcers and urinary tract infections. This is in line with findings in the United States. The study also concluded that caution should be taken when policy changes in hospitals are implemented to replace professional nurses with lower categories of nursing staff in the skill mix as this could lead to patient falls and other adverse events (Aiken *et al.*, 2016:8).

In a study conducted in the United Kingdom, Rafferty, Clarke, Coles, Ball, James, McKee and Aiken (2007:7) found that hospitals with higher nursing staff to patient ratios have better outcomes in comparison to hospitals with lower ratios. In addition, higher staffing levels were associated with lower staff burnout and dissatisfaction amongst nurses. These findings are supported by a study undertaken by Aiken *et al.* (2002:1992) in Pennsylvania.

Staggs, Knight and Dunton (2012:194–199) examined the relationship between unassisted falls and the numbers of registered nurses and non-registered nurses in a sample of 1 504 nursing units in 248 acute-care hospitals in the United States. They found that higher numbers of non-registered nurses were associated with higher rates of unassisted falls across all the units, except for the rehabilitation unit. Measuring the rate of unassisted falls that have higher injury and mortality rates is an effective means of determining the quality of nursing care. The study found that if staffing is increased above the mean nurse-patient ratio, the rate of unassisted falls drops, across the different nursing units (Staggs *et al.*, 2012:198).

Kalisch *et al*. (2012:7) reported that falls not only have adverse consequences for the patients, but also for the staff caring for them. Nursing staff often feel guilty if patients fall while in their care.

2.4 FALL RISK ASSESSMENT TOOLS

The assessment of patients to prevent falls is the initial focus of any fall-prevention programme. Institutions have developed many tools to assist in this process. Studies have shown that such tools can predict patients' falls with sensitivity greater than 70% (Feil & Gardner, 2012:73). The initial screening of patients with these tools forms the basis of the assessment that aims to identify patients at risk. In their findings, Feil and Gardner (2012:73) estimated that, based on the clinical manifestations of the patients, 78% of falls could be

anticipated. A further 8% were unanticipated (this percentage was linked to sudden physiological changes) and 14% were accidental. The accidental falls could be ascribed to environmental factors playing a role in the fall of the patients.

Feil and Gardner (2012:73) stated that the anticipated falls could be prevented if the assessment tools are used to identify the patients' risk factors. Accidental falls can be prevented if environmental checks are done to ensure that the environment surrounding the patients is safe. Unanticipated falls, as the name indicates, are very difficult to prevent because of the unpredictability of physiological changes in patients.

Risk assessments of patients should be conducted on admission to establish baseline assessments. Thereafter, assessments should be done when patients are transferred to other units, if their condition changes, or after a fall (Feil & Gardner, 2012:74). This is a general guide for assessments times (it is acknowledged that specific tools might have more specific guidelines). Feil and Gardner (2012:73) compared the Morse Fall Scale, developed by Janice Morse with the Johns Hopkins (Johns Hopkins Nursing, 2007:1) and Hendrich II (Hendrich, 2007:52) assessment tools. The validity of the assessment tools is measured in terms of sensitivity and specificity. Sensitivity refers to the ability of the tool to correctly identify patients at risk, while specificity refers to the ability to identify patients not at risk of falling (Grove *et al.*, 2015:296).

2.4.1 The Johns Hopkins tool

The Johns Hopkins tool (Table 2.1), which was developed in 2005 and revised in 2007 at the Hopkins Institute for Medicine, is an evidence-based tool that takes into account age, fall history, elimination and bowel functions, medication, patient-care equipment, mobility, and cognition in the assessment of patients. This tool also has various scores attached to questions that identify moderate or high risks of falling (Johns Hopkins Nursing, 2007:1). This tool includes both extrinsic and intrinsic risk factors.

Klinkenberg and Potter (2017:11) examined the Johns Hopkins Assessment Tool and found that, although it does reduce the fall rate in a hospital, the tool can also underestimate the risk for certain patients, due to not assessing all risk factors, resulting in a fall. Outcomes of implementing the Johns Hopkins Fall Risk Assessment toolkit include its ability to standardize the assessment of fall risk and improve hospital and patient safety. Further, it can be adapted to fit the specific needs and guidelines of a hospital or setting (Klinkenberg & Potter, 2017:12).

Although the Johns Hopkins Assessment Tool was evaluated for content validity and acceptability, it needs further validity and reliability testing, as acknowledged by its creators (Feil & Gardner, 2012:75). Sensitivity and specificity were not determined. Consequently, the tool is only effective if it is associated with a fully implemented fall risk programme.

Table 2.1: Johns Hopkins Assessment tool (Johns Hopkins Nursing, 2007:1).

If a patient has any of the following conditions, check the box and apply Fall Risk Assessments as indicated. **High Fall Risk –** apply High Risk Fall Interventions per protocol o History of more than one fall within 6 months before the admission o Patient has experienced a fall during this hospitalization o Patient is deemed high fall-risk per protocol (e.g. seizure precautions) **Low Fall Risk** – Implement Low Fall Risk interventions per protocol o Complete paralysis or completely immobilised **Do not continue with Fall Risk Score Calculation if any of the above conditions are checked.**	
FALL RISK SCORE CALCULATION – Select the appropriate option in each category. Add all points to calculate Fall Risk Score. (If no option is selected, score for category is 0).	**Points**
Age (single select) o 60-69 years (1 point) o 70-79 years (2 points) o Greater than or equal to 80 years (3 points)	
Fall History (Single select) o One fall within 6 months before admission (5 points)	
Elimination, Bowel and Urine (single select) o Incontinence (2 points) o Urgency or frequency (2 points) o Urgency/frequency and incontinence (4 points)	
Medications: Includes Patient Controlled Analgesia (PCA)/opiates, anticonvulsants, anti-hypertensives, diuretics, hypnotics. laxatives, sedatives and psychotropics (single select) o One present (1 point) o Two presents (2 points) o 3 or more (3 points)	
Mobility (multi-select: choose all that apply and add points together) o Requires assistance or supervision for mobility, transfer, or ambulation (2 points) o Unsteady gait (2 points) o Visual or auditory impairment affecting mobility (2 points)	
Cognition (multi-select: choose all that apply and add points together) o Altered awareness of immediate physical environment (1 point) o Impulsive (2 points) o Lack of understanding of one's physical and cognitive limitations (4 points)	
Total Fall Risk Score	
Scoring: 6-13 = Moderate Fall Risk, >13 Total points = High Fall Risk	

2.4.2 The Morse Fall Scale

This tool is a rater-administered instrument that was developed to identify patients at risk of falling during hospitalization (Morse, Morse & Tylko, 1989:366–377). It consists of six elements that are used to assess the likelihood of a patient falling. It has a sensitivity score of 78% and a specificity score of 83%, making it a valid and reliable tool to use (Feil & Gardner, 2012:76). The Morse Fall Scale only monitors intrinsic factors.

According to Morse *et al.* (1989:366), the six elements that make up their tool are as follows:

a) The history of falling takes into account a fall during a patient's current hospital visit or immediately prior to admission.

b) The secondary diagnosis refers to one or more medical diagnosis listed on a patient's folder.

c) Ambulatory aid refers to the degree of mobility of a patient. The following are categorized together: the patient can walk without assistance, use a wheelchair, or is on bed rest and does not get out of bed. The next group refers to assistance devices that are required, for example a cane, crutches or a walker. The last grouping regarding mobility is when a patient needs to hold onto furniture or requires some other form of support.

d) Any intravenous lines or Heparin locks used on a patient.

e) Gait refers to the patient's manner of walking: walking is normal with the head held erect, or it may be weak if the patient stoops and shuffles. The next is impaired gait where a patient has difficulty getting up from a chair. The head is held down and the patient grasps onto furniture or some other form of support to become active.

f) Mental status refers to a patient's own judgment of his or her ability to become mobile.

Table 2.2: The Morse Fall Scale.

Item			Score
1) History of falling (within 3 months)	Yes: 25	No: 0	
2) Secondary diagnosis	Yes: 25	No: 0	
3) Ambulatory assistance			
3.1) Bed rest/nurse assist	0		
3.2) Crutches/cane/walker	15		
3.3) Furniture	30		
4) Intravenous infusion / Heparin lock	Yes: 25	No: 0	
5) Gait/transferring			
5.1) Normal/bed rest/immobile	0		
5.2) Weak	10		
5.3) Impaired	20		
6) Mental status			
6.1) Orientated to own ability	0		
6.2) Forgets limitations	15		

(Morse *et al.*, 1989: 366 – 377)

The interpretation of the scores after the assessments have been performed is as follows:

- 0–24: no risk, with normal nursing care needed
- 25–50: low risk, with standard fall prevention measures needed
- 51: high risk, with very specific fall prevention plans needed.

The standard and specific fall-prevention plans that should be implemented are hospital-/institution-specific and should be developed by each facility. The authors also recommend that the Morse Fall Scale should be adjusted for each institution. The risk cut-off may vary depending on the institutions' fall risk profile. It will also vary between acute and rehabilitation institutions and nursing homes for the elderly (Morse *et al.*, 1989:366).

2.4.3 The Hendrich II Fall Assessment Tool

The Hendrich II Fall Risk Assessment Tool is a decisive and brief numerical validation instrument that is used to predict a patient's fall risk. The Hendrich II Assessment Tool assesses the intrinsic factors and assigns a score to each of the eight components assessed. Together with assessing these factors, a get-up-and-go test is also performed to determine a patient's level of mobility and muscle strength (Hendrich, 2007:51). The tool does not include extrinsic factors because of the higher rate of physiological conditions that cause patient falls.

The tool was developed to assess patients in an acute hospital setting. The Hendrich II tool's major strengths are its conciseness and inclusion of medications most likely to suppress central nervous system functions as an assessment factor. This tool can be incorporated into existing nursing documents with the consent of the authors, thereby reducing paperwork and improving patient care (Hendrich, 2007:55).

The validity and reliability of this tool were established in a large case control study in an acute tertiary institution. The content validity was established by means of a literature review. Furthermore, the instrument's sensitivity measured 74.9% and its specificity 73.9%, with the interrater reliability measuring 100% (Hendrich, 2007:55).

Table 2.3: Intrinsic factors as assessed by the Hendrich II Tool

Intrinsic factor	Score
Confusion, disorientation and impulsivity	4
Symptomatic depression	2
Altered elimination	1
Dizziness or vertigo	1
Gender: male (being male was found to be an independent risk factor for falls)	1
Administration of anti-epileptics (or changes in dosage or cessation)	2

Administration of benzodiazepines	1
• Poor performance in rising from a seated position in the Get-up-and-go test:	
• Able to rise in a single movement – no loss of balance	0
• Pushes up, in one attempt	1
• Multiple attempts, but successful	3
• Unable to rise without assistance	4

(Hendrich 2007:52)

The Hendrich II tool is very specific about the assessment times of patients, namely, assessment on admission, with every shift change, and when a patient's condition changes (Hendrich, 2007:52). This will ensure that the patient at risk is identified timeously and fall-prevention measures can be implemented. Because this specific tool is used in the hospitals that were involved in the study and thus has relevance for this study, the factors it assesses are discussed in greater detail than has been the case with the other assessment tools. This more comprehensive discussion will also facilitate understanding of the findings of the study discussed in Chapter 4.

2.4.3.1 Discussion of the various headings in the tool

A discussion of the different headings in the tool is important to facilitate an understanding of the meaning of each subcategory, and to ensure uniformity when the assessments are performed.

a) Confusion, disorientation and impulsivity are assessed by means of history-taking, discussions with a patient, and observation of specific behavioral patterns. There is no need to differentiate between acute or chronic confusion and disorientation, since if either is present a score of 4 is allocated. Furthermore, a score of 4 is given if any of the following is present: impulsive or unpredicted behavior; hallucination; agitation; changes in attention span and in the level of consciousness; inappropriate behavior; disorientation regarding time, place and person; and an inability to follow instructions.

b) Depression is assessed and a score of two is allocated if a patient is currently depressed or was previously diagnosed with depression. If the patient presents with prolonged feelings of helplessness, hopelessness, tearfulness, a loss of interest in activities, or a melancholic mood or withdrawal, a score of 2 is proposed and reported to the physician for further interpretation. This is not a diagnosis of depression, but acknowledgement that further investigation is necessary.

c) Altered elimination, i.e. if a patient suffers from incontinence, urgency, diarrhea, and urinary frequency at night a single point is allocated. An indwelling catheter is not considered as an altered elimination need. It is important to note that any patient who scores higher than 5 on the total score, is always at risk when using the toilet, despite the score for elimination.

d) Dizziness or vertigo is identified from a patient's history, unless specifically mentioned by the treating physician. It is important to note what patients themselves report and what a nurse records in their history. Some patients might refer to the room turning, or they feel as though they are turning. In practice, patients normally report that they cannot stand up on their own.

e) Male gender always scores one. Studies conducted by the developer of the tool and her team showed that men generally have a higher risk of falling in comparison to women.

f) Medications. Anti-epileptic medication and benzodiazepines are the only medications described and assessed by this tool. They are considered to be independent risk factors because of their effect on the central nervous system, potentially causing ataxia, weakness, and gait changes. All patients receiving anti-epileptic medication receive 2 points and those receiving benzodiazepines are allocated 1 point. The patients must be taking the medication when the assessment is performed.

g) The **Get-up-and-go test** scores between 0–4, depending on a patient's ability to rise (see Table 2.3). This test can also include walking, but it was determined that the get-up-and-go test is adequate for determining the risk factor. Importantly, the first few steps of a patient's movement should be observed to assess his or her ability to use the legs and lift the feet to walk without assistance.

A total score of 5 or higher for the assessment tool indicates a risk of falling, and a specific fall-prevention nursing plan should be implemented. The nursing plan should include hourly nursing rounds, including elimination rounds, with a focus on the patient's specific needs. It should be possible to identify such patients by means of a brightly colored armband and they should be advised not to move around alone. The patient's family should be cognisant of the nursing plan and be informed of the risk. The call bell should always be placed close to the patient. If a bed-exit alarm is available, it can be attached to the bed (Hendrich, 2007:54).

Feil and Gardner (2012:79) found that the Morse and Hendrich II assessment tools can be used in hospital settings to determine fall risk. This was also the case in a prospective observational cross-sectional design study by Nassar, Helou and Madi (2013:1620) that found that both tools were suitable for use in a Middle East (Lebanon) hospital. However, they preferred the Hendrich II assessment tool due to the higher sensitivity and specificity of the tool.

The literature advise that risk assessment alone will not lead to a decrease in falls. Each institution should determine its own risk factors, including environmental factors and evaluate the current fall profile to develop an appropriate preventative plan to follow (Feil & Gardner, 2012:79). A multi-disciplinary team approach is needed to prevent falls. The nursing staff alone cannot implement a preventative plan and need the assistance of the institution's total multi-disciplinary team and support services. It is evident from the literature that fall risk assessment tools focus more on intrinsic rather than extrinsic factors (Hendrich, 2007:52).

2.5 QUALITY IMPROVEMENT

Quality improvement is defined as the combined efforts of healthcare professionals, patients and their families, as well as the rest of the team involved in caring, to make the changes that will lead to better patient outcomes (health), better system performance (care) and better professional development (Batalden & Davidoff, 2007:2). Watson *et al.* (2015:84) implemented a fall-prevention programme that was phased in over a five-year period. Years 1–2 saw the introduction of a central incident-reporting system in the hospital; additional risk assessments and more comprehensive details on the nursing report; non-slip socks for patients; removal of other socks, and the provision of information to patients and their families. In year 3 further actions were introduced, including "call don't fall" signage at the bedside; identification of moderate and high-risk patients on the patient capacity board; installation of bed-exit alarms, and the development of patient/family brochures. During year 4, fall-prevention programmes were included in the patient quality summit conference; verbal bedside handovers concerning patients that occur between staff at the beginning of a shift, and communication on white boards in the patient's room were introduced. Finally, during year 5, e-learning modules in fall prevention were developed for nursing staff (Watson *et al.*, 2015:84). Despite these actions, only a marginal decrease in patient falls occurred.

Although various facilities have fall-prevention programmes in place, managers should ensure that the actions specified in the programme are executed. As mentioned previously (see section 2.3.1 above), internationally hospitals face a major concern regarding fall rates.

Despite having programmes in place, the reduction in falls was not significant (Watson *et al.*, 2015:84). No literature regarding patient falls in hospitals in South African could be found.

The hospitals that were included in this study have identified falls as an aspect of their quality improvement plans. This is similar to the fall-prevention programme and incident-reporting system described by Watson *et al.*, (2015:85). When falls are reported as incidents, it is possible to discern a trend and the root cause of the falls can be determined. This can lead to change in the factors potentially identified as causing the falls. It is also important to note that certain falls cannot be prevented (Watson *et al.*, 2015:85). Respecting a patient's autonomy and keeping him or her safe are often factors linked to falls. Some patients have difficulty accepting the physiological changes to their bodies which make them less mobile and increase their risk of falling. Dykes *et al.* (2009:301) identified six issues that could potentially lead to falls and their prevention. These are the patient report, information access, signage, the environment, teamwork, and involving the patient and his or her family in prevention strategies.

2.5.1 Patient report

Patient report refers to the verbal exchange concerning patients that occurs between staff during handover at the beginning of a shift (Dykes *et al.,* 2009:302). Dykes *et al.* (2009:300) found that not all nurses receive a comprehensive report on the patients. Despite being responsible for caring for a patient, essentially a nursing assistant might not always know about his or her fall risk. Rush *et al.* (2008:358) referred to "knowing the patient". This is an integral part of the nurse–patient relationship. When a nurse "knows" her patients, she also knows their risks and can attend to them effectively. When a nurse merely "knows about the patient", an increased risk arises since the nurse has less direct contact with her patients and therefore, does not have access to all the information concerning the patients (Rush *et al.*, 2008:358).

2.5.2 Information access

Information access refers to situations where both registered nurses and nursing assistants do not know their patients and their needs (Dykes *et al.*, 2009:3001). This often happens when there is a lack of adequate communication between the nursing staff and the risk assessment tool is incomplete. A nurse assisting a patient with elimination needs might not always be aware of his or her degree of mobility or movement because the patient's medical record is incomplete or often even inaccessible (Dykes *et al.*, 2009:301).

Kalish *et al.* (2012:11) noted an important factor that contributes to both assisted and unassisted falls, namely the standard of nursing care. This includes the baseline assessment

and ongoing assessments of a patient, as well as the subsequent nursing-care plan designed for a patient. The study found that fall rates are reduced when the nursing-care or baseline assessments are done accurately. These assessments refer to a patient's basic needs, medical history, and any other relevant information (Kalisch *et al.*, 2012:11).

Dykes *et al.* (2009:304) concluded that although a fall risk assessment is necessary, it is not worth much if it not successfully communicated to all stakeholders and a personalized plan is not designed for each patient.

2.5.3 Signage

Signage refers to visual cues that alert people to the possibility of fall risk and thus, are used as fall-prevention strategies. They include colored wristbands, signs at the bed, and the bed alarm (Dykes *et al.*, 2009:323). Signage is important and assists nurses to identify fall risk but because they are part of the daily workplace, nurses sometimes become so accustomed to signs that they tend not to notice them. Another concern with these signs is that they are generic and do not specify the actions required to prevent falling (Dykes *et al.*, 2009:323). However, nurses do apparently rely on the signage for approximately the first hour of a shift, until handover reports and communications are completed between the shifts.

2.5.4 Environment

Environment relates to a patient's immediate surroundings. It includes an uncluttered floor and walkway to the bathroom and access to supporting devices (Dykes *et al.*, 2009:324). Rush *et al.* (2008:360) mentioned that electrical cords, intravenous lines and other medical equipment in the patient's environment could potentially cause the patient to fall.

2.5.5 Teamwork

Teamwork retains its general meaning of working together: Nursing staff relieving one another with a comprehensive handover when leaving the work station, as well as assisting and teaching each other regarding the fall risks (Dykes *et al.*, 2009:323). An analysis of the literature shows that most studies on preventing falls recommend a comprehensive interdisciplinary approach to the problem, with the nursing workforce at the center of the approach (Rush *et al.*, 2008:358).

2.5.6 Involving the patient and family

Involving both the patient and his or her family is important in any fall-prevention strategy. It is common for patients not to ask for assistance and therefore, involving the family in a fall-prevention strategy is likely to be useful since family members can encourage a patient to

communicate with the staff prior to mobilization and to request assistance (Dykes *et al.*, 2009:324).

2.6 STANDARDS

Internationally, standards for health care are in place. Standards refer to the desired level of healthcare needed to render good quality care (Booyens, Jooste & Sibiya, 2017:307). Quality standards for hospitals were first introduced in the United States of America in the "Minimum Standard for Hospitals", developed by the American College of Surgeons in 1917 (Alkhenizan & Shaw, 2011:407). The International Standards Organization (ISO) was developed in 1947.

The International Society for Quality in Health Care (ISQua) is a global organization responsible for assessing the standards of organizations. ISQua set the benchmarks in healthcare safety and quality and is the only organization to 'accredit the accreditors' (ISQua, 2018).

The National Core Standards, as developed by the Republic of South Africa (2011:22) refer to the domain of "patient safety, clinical governance and care" as reducing unintended harm to health care users or patients; preventing or managing problems or adverse events, including health care associated infections, and support any affected patients or staff. Standards are enforced by legislation in South Africa, with the Office of the Health Standards Compliance and regulations related to the norms and standards (Republic of South Africa, 2015:1).

The core standards are divided into sub-domains, standards and criteria. Sub-domain 2.4 refers to clinical risk with the associated standard that all clinical risks in units should be identified to ensure patient safety. The associated criteria include development of specific procedures and policies to ensure that risks are mitigated for patients. Sub-domain 2.5, in turn, refers to adverse events. The standard attached to this domain is to timeously report, investigate and analyze any safety incident that occurred in a unit. The relevant criteria include reporting of adverse events, staff awareness, and measurement of the number of events against the stated targets of the National Department of Health (Republic of South Africa, 2011:23). It is, therefore, imperative to assess patients' risks of falling and to carefully monitor patients in hospitals, hence the need for international standards of accreditation for hospitals.

2.7 ACCREDITATION

Accreditation allows for standards to be introduced and followed in an institution. In a systematic review of the literature to evaluate the impact of accreditation programmes on the quality of healthcare services, Alkhenizan and Shaw (2011:407) found that accreditation programmes improved the process and quality of care provided by healthcare services. Accreditation is usually obtained through a voluntary programme whereby trained external peer reviewers evaluate a healthcare organization's compliance with pre-established performance standards (Alkhenizan & Shaw, 2011:407). Accreditation was formally introduced in the United States with the formation of the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) in 1951 (Alkhenizan & Shaw, 2011:407). Standards of accreditation proposed by the Council for Health Service Accreditation of Southern Africa (COHSASA) are used in certain private hospital groups and in South Africa's government hospitals. COHSASA has received a five-year accreditation from ISQua in 2018 valid until 2022 (COHSASA, 2018).

Clearly, hospitals are responsible for keeping patients safe by adhering to set standards. Nonetheless, falls are common adverse events that impact on patients, their caregivers, and on a hospital's integrity (Rush *et al.,* 2007:362).

2.8 CONCLUSION

This chapter has shown how relevant literature has provided insight into the phenomenon of patient falls, including factors that contribute to the falls. Key factors involved in patients' falls include a lack of knowledge, inadequate or incomplete risk assessments, and a lack of meaningful communication between various people involved in fall risk prevention. The literature also indicates the role of various other factors that play a role in patient falls such as staffing levels and the skill mix. Incorrect staffing levels may be the result of a lack of patient acuity and risk assessments, which may lead to an increased risk of falling among patients. Various fall-risk assessment tools are available, with the Morse Fall Scale and the Hendrich II Tool being widely acknowledged as a result of their validity and reliability. The methodology of the study will be discussed in Chapter 3.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 INTRODUCTION

In Chapter 2 a broad analysis of available literature on patient falls in hospitals was given. This chapter discusses the research methodology applied during the study. The discussion covers the aim and objectives of the study, research setting, research design, population, instrumentation, data collection, data analysis, and ethical considerations.

3.2 AIM AND OBJECTIVES

The aim of this study was to determine factors that influence patient falls in a private hospital group in the Cape Metropole of the Western Cape. The objectives were the following:

- To identify intrinsic factors that contribute to patient falls
- To identify extrinsic factors that contribute to patient falls
- To classify the severity of the injuries sustained during patient falls, and
- To determine whether failure by nurses to conduct fall-risk assessments contributes to patient falls

3.3 RESEARCH SETTING

As indicated in Chapter 1 (see section 1.8.2 above), the study was conducted in two private hospitals belonging to the same hospital group in the Cape Metropole, South Africa.

3.4 RESEARCH DESIGN

The research design is the “blueprint” or the plan of the study, and validates the study (Grove *et al.*, 2013:214). The research design directs or guides the planning and implantation of the research to ensure that the study objectives are reached with high probable accuracy (Grove *et al.*, 2013:214). Important considerations when doing research include probability, bias, manipulation, and control. It is probable that certain situations can occur, hence the researcher needs to remain as objective as possible to reduce any form of bias. The results of the study need to be interpreted without any manipulation in order to ensure reliability and validity of the study (Grove *et al.*, 2013:202).

A quantitative research approach utilizing a retrospective descriptive study design was selected for this study. Patient documentation, incident reports, copies of electronic capturing events on the hospital data base and appropriate statistical data pertaining to each

nursing unit were used as sources of data during this retrospective audit. Descriptive designs are useful in nursing studies since not only do they enable a researcher to develop a good understanding of actions and behavior that occur in a specific area, but also facilitate an understanding of how illnesses originate, or particular incidents take place (Grove *et al.,* 2015:213).

In this study the patient falls were investigated and reported. A descriptive design was selected for this project because it comprises a non-experimental study and describes the variables that influence patient falls. These variables cannot be manipulated and are reflected in this study as they were documented in patients' records and nursing notes (Botma *et al.*, 2010:110). The frequency of certain variables had to be established in order to identify factors that influence patient falls.

3.5 POPULATION AND SAMPLING

According to Grove *et al.* (2015:46), population refers to all elements (including individuals, objects or substances) that meet the selected criteria for inclusion in a study. There are two hospitals of the private group situated in the Cape Metropole. For the purpose of this study these two hospitals were selected, both of which are classified as large hospitals with more than 200 beds. Hospital A has 250 acute beds distributed in general surgical, medical, cardio- and neurosurgical, orthopaedic, paediatric, maternity, intensive-care, as well as in high-care wards. Hospital B has 200 beds located in medical wards, various surgical wards such as vascular, general and gastro-intestinal wards, paediatric and maternity wards, and intensive-care units. All the adult falls in all the units in both hospitals comprised the target population for the study.

Botma *et al.* (2010:124) referred to a sample as a subset of the population identified for a specific study, while sampling refers to the selection of a specific group of people or events to be included in the study.

In this study, all the adult falls in all the units in both hospitals over a period of 17 months, namely October 2016 to February 2018, were included in the study. Selection of this time frame was based on availability of and access to patient records and incident reports in the electronic systems of the two hospitals. A total of 155 falls were recorded in the hospital statistics for this period; 100 falls in Hospital A and 55 falls in Hospital B. Hospital B has a lower occupancy rate than Hospital A, and the average age of patients admitted to Hospital B is younger than in the case of Hospital A. As stated in chapter 1, 21 folders had to be excluded. A biostatistician at the Biostatistics Unit at Stellenbosch University confirmed that a population of 134 constitutes an adequate sample for a descriptive study.

The falls that were considered in this study occurred in all the units in the two hospitals, including the intensive-care units. Following a patient fall, an incident report describing the circumstances of the fall is completed by hospital staff. Thereafter, an electronic severity report is compiled to capture the core aspects of the fall. These reports, together with patient records, were used as the sources of information for this study.

3.5.1 Inclusion criteria

Grove *et al.* (2013:697) referred to inclusion criteria as the specific characteristics that must be present for an element or object to be selected as part of the target population. In this study all records of adult patient falls (both assisted and unassisted), as well as related records, for example the number and categories of staff associated with the falls in all the units in the two identified hospitals, were included. The electronic as well as written incident forms were also used as sources of information.

3.5.2 Exclusion criteria

Exclusion criteria refer to characteristics that would prevent an element from inclusion in the sampling (Grove *et al.*, 2013:694). At the time of this study, a total of 15 files were not accessible because of filing errors and incomplete nursing notes. Six (6) other folders were excluded since they contained information on falls that occurred in a paediatric and neonatal unit. The Hendrich II assessment model assesses adults only, hence no assessments on children were performed. Moreover, factors influencing patient falls may differ for children and neonates in comparison with adults. The final number of patient folders that were perused was 134. In some cases the records were incomplete, but most of the information could be gathered from the incident report forms and the hospitals' electronic systems.

3.6 INSTRUMENTATION

A data-extraction sheet (Appendix A) was used to retract information retrospectively from patient documentation. The unit-specific statistics for the period relevant to the falls were analysed for staffing numbers, as well as the total number of paid patient days in the unit at the time of the patient fall. The data-extraction sheet was a self-designed instrument based on information the researcher obtained from the ECRI study on falls (Emergency Care Research Institute, 2016), the literature review and the assessment tools discussed in Chapter 2.

All aspects, including intrinsic and extrinsic factors, were included in the data- extraction sheet. The instrument was divided into three sections.

3.6.1 Section 1: Intrinsic factors (question 1.1 – 1.16.2)

The intrinsic factors included biographic information:

- Age
- Gender
- Diagnosis/co-morbidities
- History of previous falls
- Patient mobility and acuity
- Urinary irregularities
- Medication.

3.6.2 Section 2: Extrinsic factors (questions 2.1 – 2.9)

The extrinsic factors included furniture or equipment, height of the toilet, wet or uneven flooring, use of an assistance device, call bell at hand, and use of bedrails. The number and categories of staff, as well as the unit size and occupancy at the time of the fall were also considered.

3.6.3 Section 3: Patient fall (questions 3.1 – 3.7)

This section focused on the fall itself. The time of the fall, the injuries that resulted and their classification, as well as the recordings of the Hendrich II assessment performed on admission and just prior to the fall were considered.

3.7 PILOT TEST

Botma *et al.* (2010:275) described a pilot test as a smaller version of the proposed study. It uses the same setting and information; it is treated in the same way and applies the same data-collection methods. Advantages of a pilot test include, but are not limited to, determining the study's feasibility; developing the protocol; determining validity and reliability; testing data analysis techniques, and identifying potential problems that might occur during the research. According to Okeke and van Wyk (2015:372), a pilot test pretests a research instrument and can be tested on a very small sample such as 10. In an article regarding retrospective chart reviews, Vassar and Holzman (2013:5) mentions that a pilot test aids with data abstraction and assist to identify the frequency of missing information in the patient charts. Thus, evaluating the reliability and accuracy of the data abstraction document. They further recommend that approximately 10% of records be selected to conduct the pilot test. According to the authors this is only a recommendation as the pilot test will ensure that the researcher coding the documents is comfortable and understand the tool (Vassar & Holzman, 2013:5). In this study the researcher developed the tool for the collection of data and was familiar with the records of the institution.

The pilot test for this project was conducted in the two hospitals selected for the study. Ten (10) cases were reviewed; six from hospital A and four from hospital B. The time frame was August and September 2016, two months prior to the start date of the study. A research assistant was trained by the researcher to use the data-collection tool prior to commencement of the pilot test.

As mentioned above (see section 3.6 above), the data-extraction sheet was used to gather relevant information. After completion of the pilot test, there was no need to change the data-extraction sheet since it correctly measured what it was designed to measure. During the pilot test, interrater reliability or equivalence was established by comparing the research assistant's assessment with that of the researcher. This was important since the research assistant helped to gather the data (Botma *et al.*, 2010:177). The data obtained from the ten folders mentioned above were entered into the SPSS program and a descriptive analysis was done. The frequency of occurrence of certain variables was ascertained and variables that could later be transformed or recoded, for example fall-risk categories, were identified (Harris & Taylor, 2003:9). Data obtained during the pilot test were not included in the results.

3.8 VALIDITY AND RELIABILITY

Instrument **validity** refers to the capacity of an instrument to measure the variable that it is intended to measure (Grove *et al.*, 2013:389). Grove *et al.* (2015:289) defined content validity as the extent to which a measurement instrument includes all the elements relevant to the concept being measured. The design of the data-extraction instrument was based on the conceptual framework of the study, the intrinsic and extrinsic factors as discussed in chapter 2 that can influence the risk of patients falling, as well as the literature and the various fall risk assessment tools, thereby establishing content validity. Content validity is established on the basis of judgements and was determined by the supervisor and co-supervisor for the study, as well as by a Nurse Manager and a Nurse Manager General with experience in health services management from the selected hospitals. They determined that all the aspects of the intended study were adequately addressed.

Face validity refers to the instrument appearing valid and suitable for measuring what it is supposed to measure (Grove *et al.*, 2013:394). Face validity of the instrument was determined during the presentation of the research proposal to the Department of Nursing and Midwifery and ethics committee of both Stellenbosch University and the private hospital group.

The pilot test served to ensure that the data-extraction instrument met all the criteria that it was designed for, as well as that it captured all the relevant data. As discussed in paragraph

1.8.6, the researcher utilized all incident reports both written and electronic as well as all the patient documents to capture the information on the data extraction sheet. During the pilot test, the validity and reliability of the data extraction form was determined capturing the information as requested on the form.

All incident reports as well as the electronic severity reports were used as sources of information. Patient records were accessed to assess completion of the assessment tools, while medication charts were perused for details on the time of medication administration. The nursing delegation lists for the shift, which indicate the number of patients in the ward, were utilised for details on ward occupancy and the number of nursing staff on duty at the time of a fall.

Grove *et al.* (2015:510) described the **reliability** of an instrument as the degree to which it measures data consistently. Stability-reliability refers to the consistency of repeated measurement of attributes using the same scale (Grove *et al.*, 2015:512).

The data-extraction sheet was compiled with due regard for the research question, research aim and objectives of the study. During the pilot test and main study, the data collected by the researcher was compared with data collected by the research assistant to determine the level of agreement, which proved to be satisfactory. The uncertainty that arose as a result of incompleteness or non-availability of information in some of the folders was discussed, and other sources of information (the electronic versions of the incident report systems and incident reports) were scrutinized and agreement was reached on the data that were suitable for capturing.

3.9 DATA COLLECTION

Grove *et al.* (2013:45) referred to data collection as the precise and systematic gathering of information relevant to a proposed study. In a quantitative research design, the data are usually numerical. Prior to the collection of data, the research assistant, spouse of the researcher, was trained to use the data-extraction instrument. He was taught the different nursing forms and where to find this in the patient folders. He organized all the nursing charts in the patient files for the researcher to record the information as per the extraction sheet. The admission document, general assessments, medication prescription chart as well as the nursing notes were verified against the information recorded in the data extraction form by the researcher. The research assistant was remunerated prior to the process as per earlier agreement. The sum of R1 800.00 was paid to the research assistant for 30 hours of assistance. All meals during this period were also paid for. He was chosen due to the time constraint the researcher had in collecting the information.

Arrangements were made with both the hospitals and the information was made available at the requested times. This included the work space in the hospital, the availability of records as well as the use of electronic data where needed. The researcher and the research assistant gathered the data on the patient falls from the hospitals' internal electronic database systems, each patient's hospital folder, and from the hard copies of the incident forms. (Also see sections 3.5.1 and 3.5.2 above.) Completing one of these data collection exercises took approximately 30–43 minutes. Data collection was done on a full-time basis in the first three weeks of August 2018.

3.10 ETHICAL CONSIDERATIONS

The guidelines and principles, as described in the Nuremburg Code and Declaration of Helsinki, are important codes guiding researchers in their work (World Medical Association, 2013:1). These codes were developed after serious unethical research and testing occurred during the Second World War. The codes determined that anyone involved in research should give consent to take part; always have the right to withdraw at any time and be protected against harm. The Declaration of Helsinki was formulated in 1964 and saw several updates in the years that followed (Grove *et al.*, 2013:160). This declaration was specifically developed to guide medical research to ensure that ethical principles are adhered to (Grove *et al.*, 2013:160). Throughout the study a balance between risk and benefits had to be maintained (Grove *et al.*, 2013:160).

Ethics approval was obtained from the Health Research Ethics Committee (HREC) at Stellenbosch University prior to the commencement of the proposed study (Reference S18/05/097; see Annexure B). Thereafter, the proposal was submitted to the Ethics Committee of the private hospital group for further approval and to obtain permission to conduct the study in the two hospitals selected for the study (Reference 251015-048; approval as per Annexure C). This was done in accordance with the policy and ethical considerations of the hospital group. The hospital group was informed of the aim of the proposed research and what the expected outcome would be. The general contract of admission of the hospital group stated that patients' medical records remain the property of the company.

Due to the retrospective descriptive design of this study, patients' consent could not be obtained since at the time of the study they had already been discharged. Consequently, a waiver of consent was applied for.

3.10.1 Right to confidentiality and anonymity

In the guidelines of the Undergraduate Research Ethics Committee (UREC) (2016), anonymised data are described as having no identifying information that might link them to the source or patient record. No patient number, name or any contact details appeared on the data-collection instrument. Data collection was, therefore, anonymised at the point of collection. All data were reported in aggregated form.

The hospitals were identified as Hospital A and B. The information on the data extraction sheets, were numbered from A1–A100 and B1–B55. No information linking the patient name to the incident was recorded. All electronic information was password protected on the researcher's computer. All hard copies of the data extraction forms were anonymised at the collection point and stored in a locked cupboard at the researcher's home for the duration of the study. Only the researcher, research assistant, supervisors and the statistician had access to the information. All data (electronic and hard copies) gathered will be kept confidential and locked in a cupboard for at least five years. As indicated above, no information can be traced back to a patient since the information was anonymised at the point of collection once the accuracy of the data had been confirmed.

Privacy refers to a situation where patient information may not be divulged to anyone or requires people to refrain from invading patients' personal space (Pera & Van Tonder, 2011:61). Privacy also concern respecting an individual's right to confidentiality. Confidentiality is the protection of patient information and non-disclosure of the names of patients involved in the study (Pera & Van Tonder, 2011:61). This was achieved by the anonymity that was ensured at the point of information collection.

As far as the patients whose records were accessed were concerned, it was previously mentioned that a waiving of patient consent was applied for (see section 3.10 above). Moreover, no patient was identified in any way, and no case studies or specific cases were described or mentioned. Only information relating to the factors mentioned in the instrument was collected. The names of the hospital and of the hospital group were also protected in the process.

3.10.2 Right to protection from discomfort and harm

Non-maleficence requires the researcher to refrain from harming patients or the company involved in the research (Pera & Van Tonder, 2011:55). Beneficence involves always doing good to individuals (Grove *et al.*, 2013:174) and being morally obliged to do what is right for other people (Armstrong *et al*., 2013:145). It entails balancing the benefits of treatment against any risks, and in this study the balance between potential risk to patients and the

benefit of the research was considered. The degree of risk to the individual should never exceed the benefit of the study (Grove et al., 2013:175).

It was necessary to assess the expected outcome of the study and prevent any harm befalling the patients. The study poses minimal risk to the participants and they will not benefit directly. For positive good to be done to the patients as a result of this study, its outcome will be utilised to improve nursing measures to prevent patient falls from occurring in the identified hospitals in future. In this study the researcher identified patterning in the factors that influence patient falls and subsequently made recommendations to reduce the risk of falls.

3.11 DATA ANALYSIS

Grove *et al.* (2015:319) described data analysis as the reduction, organizing, and ascribing of meaning to data. In this study descriptive analysis was performed to describe the variables in the study. The researcher created a spreadsheet on the Statistical Package for the Social Sciences (SPSS) to which the variables indicated on the research instrument were added. Thereafter the data that had been collected were imported onto the spreadsheet. The supervisor assisted with the data analysis, making use of SPSS Version 25 to complete the process (IBM Corp, 2017). A senior statistician, Dr Carl Lombard, confirmed and checked the analysis and interpretation as described in Chapter 4.

3.11.1 Descriptive statistics

According to Grove *et al.* (2015:319), descriptive statistics are used to organize data in a manner that gives meaning to and guides the interpretation process. Examples of descriptive statistics include frequency distributions and measures of central tendency.

Since this study is descriptive in nature, descriptive statistics were used to summarize the data set. The data is presented in visual form using graphs and tables (Botma *et al.*, 2010:149).

Frequency distributions were used to display the nominal or ordinal level data. These include, for example, gender, diagnosis, type of ward, and the various intrinsic and extrinsic factors (Grove *et al.*, 2015:330). Continuous variables that were examined included age, number of staff members per category, number of beds, bed occupancy rate, and the Hendrich II risk scale scores.

Measures of central tendency are often referred to as the midpoint of data or an average of the data (Grove *et al.*, 2015:331). The mode refers to the number that occurs most

frequently. This does not indicate the center of the data set (Grove *et al.*, 2015:331). The median is the midpoint of the ungrouped frequency distribution (Grove *et al.*, 2015:331). The mean or average is the sum of the scores divided by the number of scores. The mean might not be a number represented in the range of values (Grove *et al.*, 2015:331).

The measure of dispersion refers to individual differences between the members of the sample. This gives meaning to the dispersion of the scores around the mean (Grove *et al.*, 2015:333). The range is calculated by subtracting the lowest from the highest score (Grove *et al.*, 2015:331). Standard deviation refers to the square root of the variance. It measures the average deviation from the mean in a specific sample (Grove *et al.*, 2015:332).

3.11.2 Inferential statistics

Inferential statistics take data from a sample and makes inferences about the larger population from which the sample was drawn. Because of the goal of inferential statistics, namely drawing conclusions from a sample and then using these to generalize for an entire population, it is important that the sample accurately reflects the population (Grove *et al.*, 2015:323).

The Chi-square test of independence determines whether two nominal or ordinal level variables are independent or related. This is a computed test that compares the frequencies of values with what is expected (Grove *et al.*, 2015:347). When the assumptions of the Chi-square test were not met, Fisher's exact test was performed. Fisher's exact test is an accurate instrument for determining the association between categorical variables (Harris & Taylor, 2003:35).

The t-test refers to the analysis of the mean differences between groups (Grove *et al.*, 2015:349). When data is not normally distributed, a non-parametric test, the Mann-Whitney U-test is used. The Mann-Whitney U-test, as described by Harris and Taylor (2003:31) determines whether there is a significant difference between two sets of data that originate from two different sets of subjects.

Regression analysis is used to predict the value of one variable when one or more other variables are known (Grove *et al.*, 2015:344). Logistical regression was specifically used to predict whether fall risk assessment predicted the injury severity of a patient measured on a nominal level in this study. This is often used in nursing studies to predict the response of patients to certain treatments or interventions (Grove *et al.*, 2015:344).

3.12 SUMMARY

In this chapter the methodology of the study and the various steps followed in the research process were discussed. The research design, population and sampling, instrumentation, data collection and analysis, as well as ethical considerations received attention. In the following chapter the results of the research and interpretation of the data collected will be discussed.

CHAPTER 4
RESULTS

4.1 INTRODUCTION

In Chapter 3 the research design and the processes followed during the course of the study were discussed. In this Chapter data that was collected during the research is analysed and discussed. The data was imported into the SPSS programme and analysed by the supervisor with the assistance of a statistician. The findings of the study are presented to correspond with items on the data-extraction form.

A process of data analysis reduces, organizes and gives meaning to data (Grove *et al.*, 2015:47). As discussed in Chapter 3, descriptive data analysis was applied in this study. The total of 134 data sheets were processed, which constituted 86% of the original anticipated number of patient records. After entering the data into SPSS, an initial descriptive statistical analysis was conducted, and the data checked for accuracy. No corrections or clean-up of the data were required. The data is presented in frequency distributions, graphs and tables. All decimals were rounded to one decimal, and where statistical tests were performed, a p-value of ≤ 0.05 was deemed significant.

4.2 SECTION 1: INTRINSIC FACTORS

This section deals with intrinsic factors in line with such factors that were included in the data-extraction form. The variables discussed in this section include age, gender, diagnosis and co-morbidities, mobility and acuity, urinary irregularities, and medications that were identified in the literature as factors influencing patient falls.

4.2.1 Age

The results depicted in Figure 4.1 indicate that the mean age of the patients who had fallen was 68.37 years (Standard deviation (SD) 15.1). The age range was from 20 to 92 years.

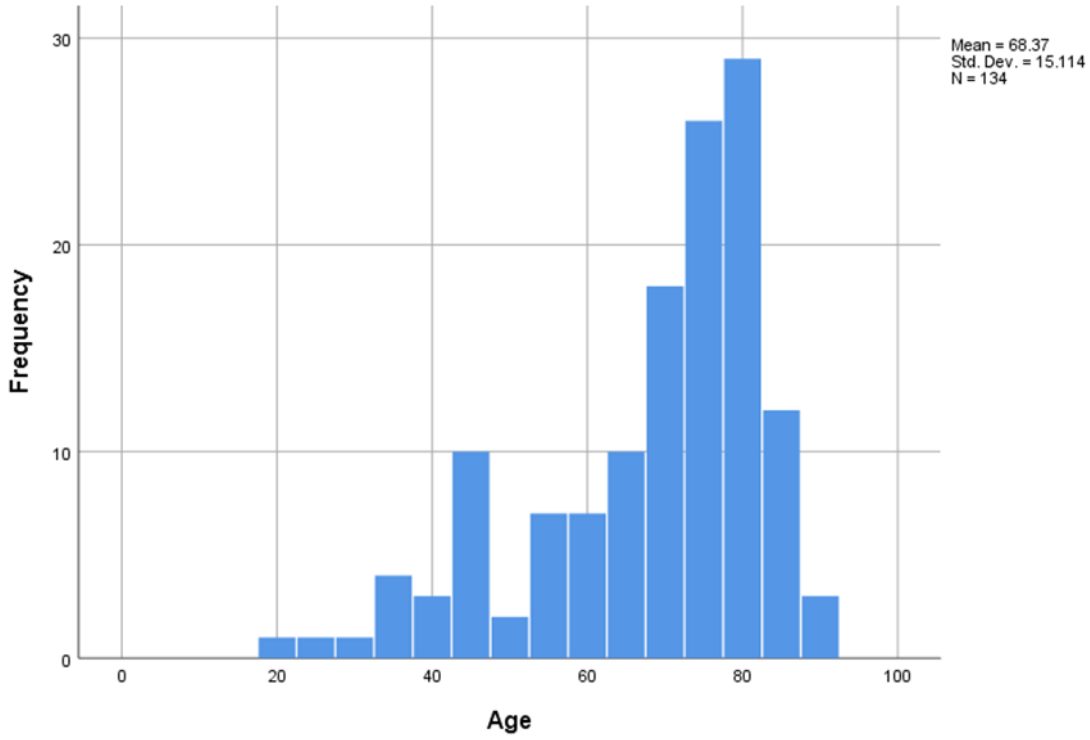


Figure 4.1: Histogram of age of participants (n=134)

4.2.2 Gender

Figure 4.2 indicates that more women (n=70; 52.2%) than men (n=64 47.8%) fell during the specified period of data collection in the hospitals involved in this study.

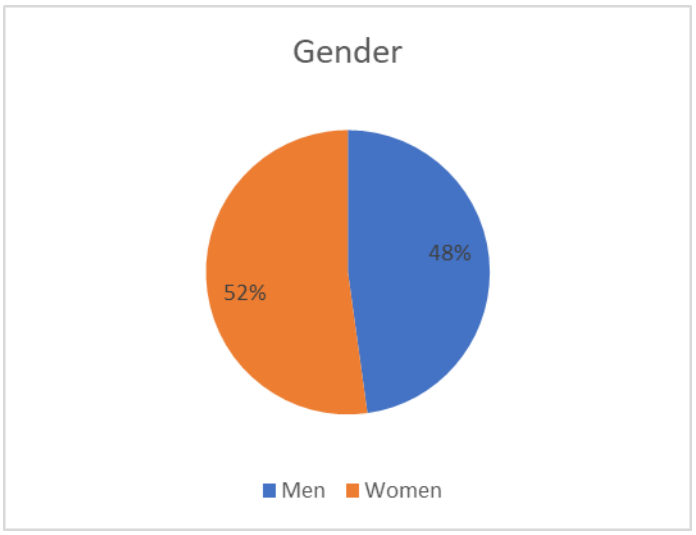


Figure 4.2: Pie chart of gender distribution (n=134)

The mean age of men (71.8; n=64) was higher than that of women (65.2; n=70). Since age was not normally distributed, a non-parametric test (Mann-Whitney U test) was performed

which showed that the age difference between men and women was significant (p=0.04). Men who fell were more likely to be older when compared with women (Figure 4.3).

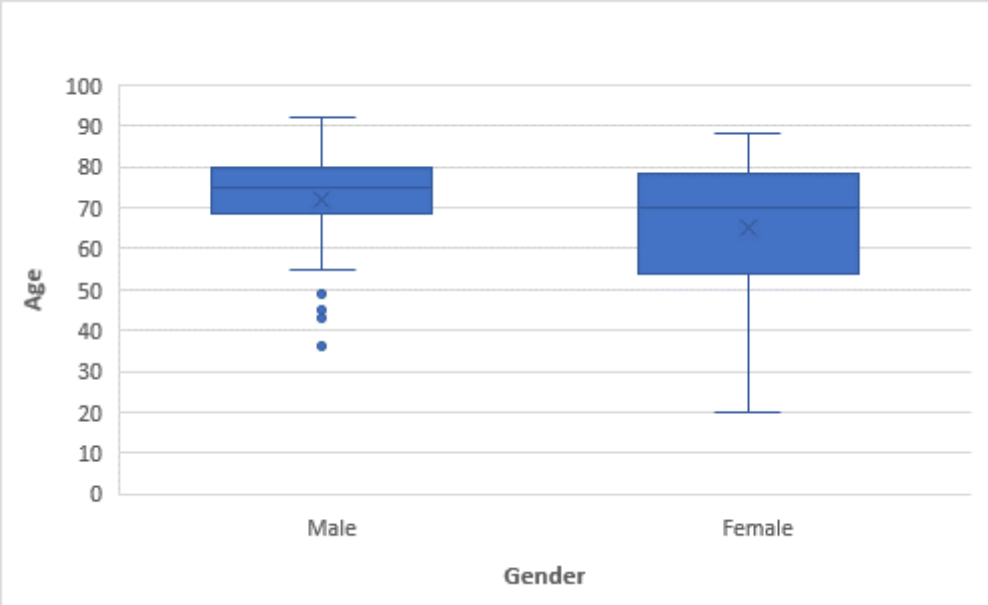


Figure 4.3: Age distribution according to gender

4.2.3 Admission diagnosis

Figure 4.4 illustrates the diagnoses of the patients who had fallen. Diagnosis are categorized as follows: medical, general surgical, orthopaedic surgical, neuro/vascular, and cardiac and mental disorders. Among the patients implicated in this study, the highest number of falls occurred among general medical patients (n=52; 38.8%), followed by orthopaedic patients (n=28; 20.9%), neurovascular/cardiac patients (n=22; 16.4%), surgical patients (n=21; 15.7%) and lastly, mental health patients (n=11; 8.2%).

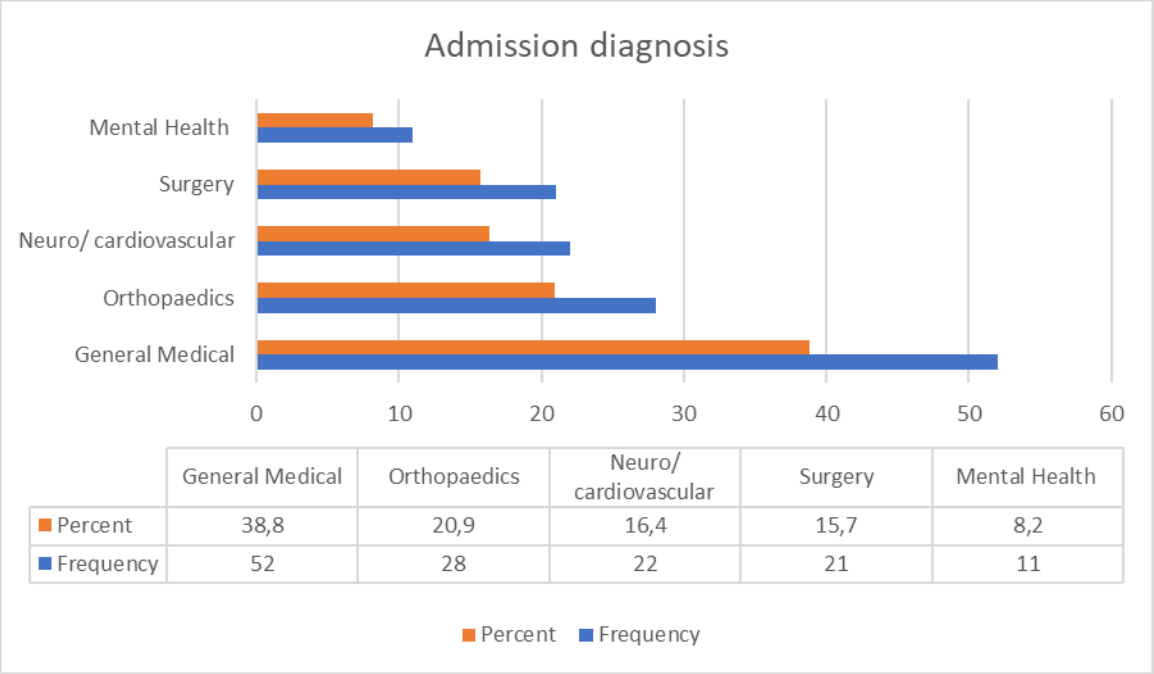


Figure 4.4: Admission diagnosis (n=134)

4.2.4 Number of co-morbidities

The presence of co-morbidities was classified into different groups: those with no co-morbidity; patients with at least one co-morbidity; those with at least two, and lastly, those with more than two co-morbidities. Typical co-morbidities were diabetes, hypertension, respiratory disease and heart disease. Table 4.1 depicts patients with no co-morbidity (n=26; 19.5%), those with one co-morbidity (n=52; 39.1%), patients two co-morbidities (n=38; 28.6%), and those with more than two (n=17; 12.8%).

Table 4.1: Co-morbidities (n=134)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	26	19.4	19.5	19.5
	One	52	38.8	39.1	58.6
	Two	38	28.4	28.6	87.2
	More than two	17	12.7	12.8	100.0
	Total	133	99.3	100.0	
Missing	System	1	0.7		
Total		134	100.0		

4.2.5 History of previous falls

Regarding the history of previous falls, Table 4.2 shows that only three patients (n=3; 2.2%) had fallen prior to admission. The Hendrich II assessment form does not include previous

falls. Information on previous falls relevant to this study was obtained from the nursing notes located in patients' folders. Other tools, as discussed in Chapter 2, included the history of previous falls as an intrinsic factor in determining fall risk.

Table 4.2: History of previous falls (n=134)

History of previous falls	Frequency	Percent
No	131	97.8
Yes	3	2.2
Total	134	100

4.2.6 Patient mobility

Patient mobility was categorized as "independent" (mobilization without assistance); "with assistance" (either a walking frame or a wheelchair, or by means of physical assistance by a healthcare worker), and "immobile" (either bedridden or completely non-mobile). Figure 4.5 indicates that among the patients who had fallen, 41% (n=55) were independent; 56% (n=75) were mobile with assistance, and 3% (n=4) were immobile patients. It is evident that most of the patients who fell needed assistance with mobility. Patients who are mobile with assistance may be at a high risk of falling if they fail to ask for assistance or if there are too few staff members available to assist them.

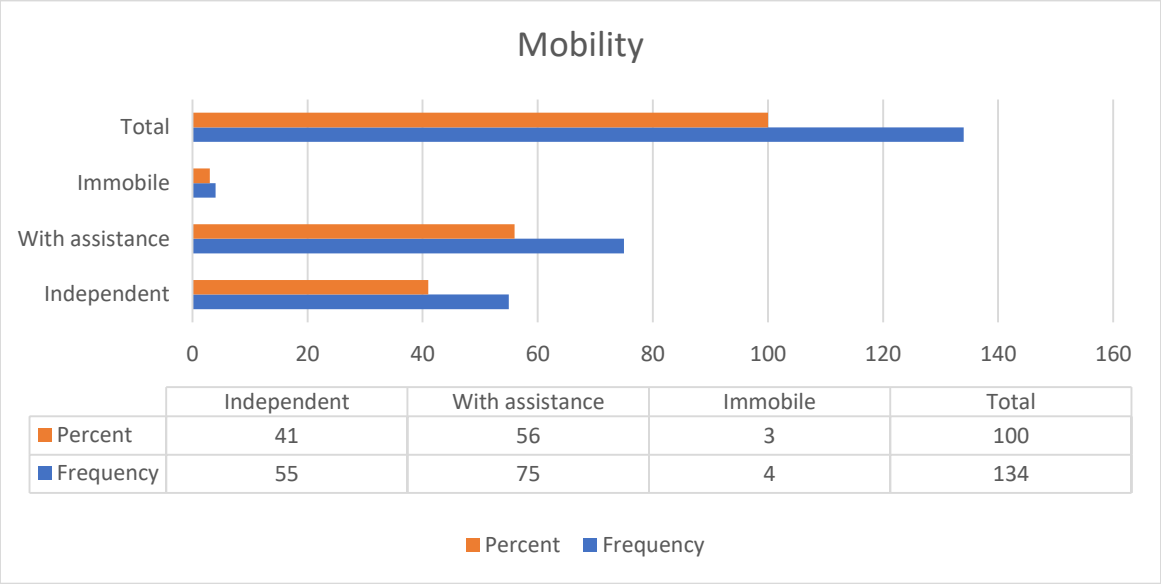


Figure 4.5: Patient mobility (n=134)

4.2.7 Patient acuity

Patient acuity was recorded as "minor", "moderate" and "major". The internal assessment documents in use at the hospitals involved in this study assessed the need among patients

for assistance regarding basic requirements, hygiene and nutrition, mobility, educational input, intravenous therapy, medication administration route, other nursing-related monitoring as with an electrocardiogram (ECG), oxygen supply, wound dressing and all other wound management, as well as isolation and barrier nursing. Patient acuity is categorized as follows:

a) Minor, indicating a score of less than 8 on the assessment form. Patients can assist themselves and do not require additional assistance.
b) Moderate, indicating a score of between 9 and 19, which calls for greater nursing intervention and care.
c) Major, indicating a score of $\geq$20. Here the implication is that patients are unable to care for themselves and there is a need for more specialized nursing interventions and assistance. Accurate and correct classification of patients is very important since this determines the level of care that is required (Cronje, 2016:9).

The data included in the patients' records appeared to be correct for the patients' diagnoses.

In Figure 4.6 the distribution of patients in terms of acuity is given as minor (n=11; 8.2%), moderate (n=76; 56.7%) and major (n=47; 35.1%). It is evident from this information that a higher fall rate occurred among patients with moderate acuity. It is possible that such patients overestimated their physical ability and capability, which may have resulted in falling. Despite patients being encouraged to call for assistance, many persisted in moving around on their own. From the literature it is apparent that this group of patients is the most likely to fall since they overestimate their own ability and mobility. A study by Staggs *et al.* (2014:7) showed that men overestimated their ability to become mobile and moreover, that they were unwilling to ask for assistance. However, in this study no association between gender and patient acuity was discerned (X^2 df [2]=4.2; p=0.12).

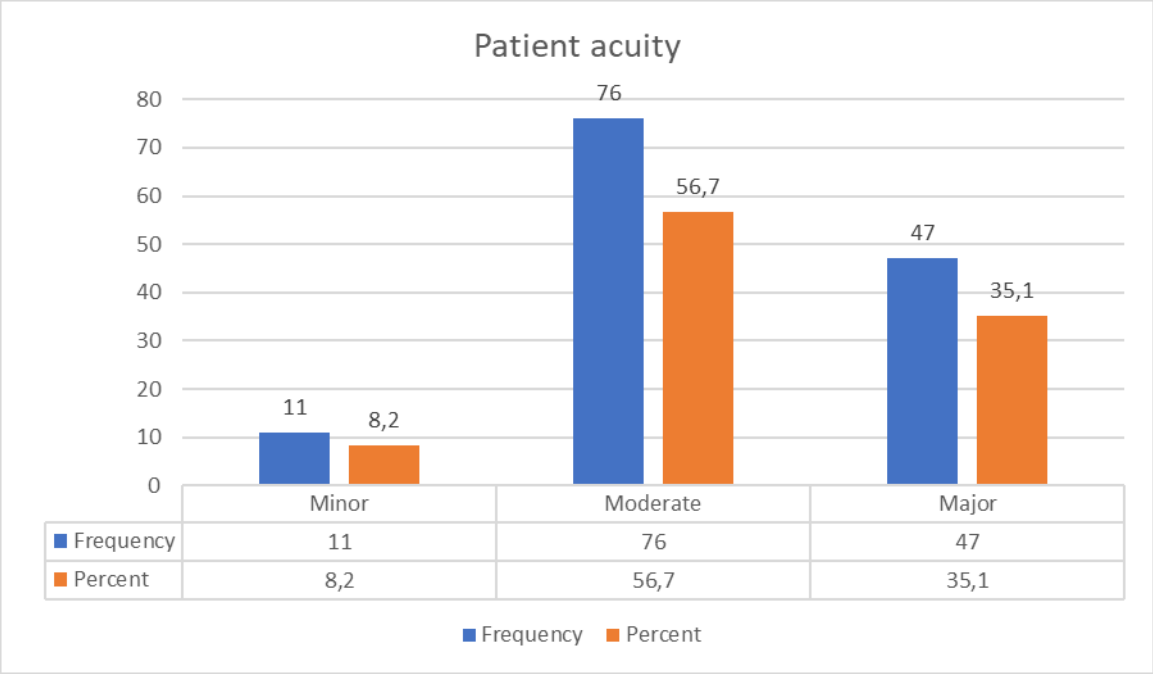


Figure 4.6: Patient acuity (n=134)

4.2.8 Urinary irregularities

Table 4.3 indicates the urinary irregularities emerging from the data analysed in this study. For none of the patients involved in the study was there any mention of or assessment note indicating urinary frequency. A very small percentage n=6 (4.5%) of the patients were incontinent.

Dialysis was implicated in n=7 (5.2%) of the falls. The patients involved fell post-dialysis as a result of either a change in their condition or a sudden or unexpected movement. One patient fell as he miss stepped on the scale. Ten patients, or 7.5%, had been catheterized at the time of the fall.

Table 4.3: Urinary irregularities

Urinary irregularities	Options	Response n (%)
Frequency	Yes	0 (0)
	No	134 (100)
Incontinence	Yes	6 (4.5)
	No	128 (95.5)
Dialysis	Yes	7 (5.2)
	No	127 (94.8)
Catheterization	Yes	10 (7.5)
	No	124 (92.5)

4.2.9 Mental state

Figure 4.7 indicates that 32.5% (n=44) of the patients suffered from some mental disorder such as delirium, depression, dementia or confusion. The eleven patients in the mental health unit who fell are also included in these figures.

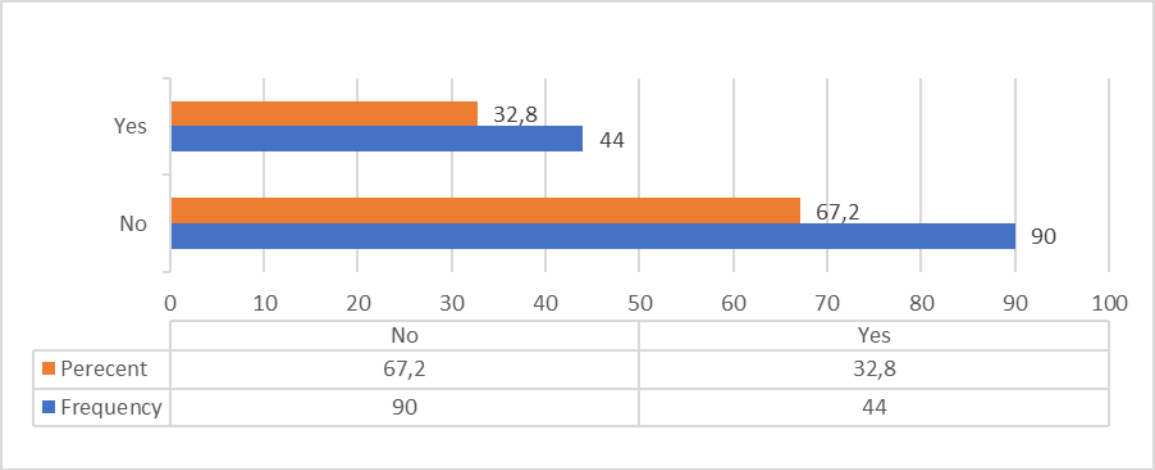


Figure 4.7: Mental state (n=134)

4.2.10 Visual and hearing disturbance

Table 4.4 illustrates the results for visual and hearing disturbances. No patients were visually impaired to the extent that they were unable to see. Only one patient had a hearing disorder and used a hearing aid.

Table 4.4: Visual and hearing disturbance

	Options	Response n (%)
Visual disturbance	Yes	0 (0)
	No	134 (100)
Hearing disturbance	Yes	1 (0.7)
	No	133 (99.3)

4.2.11 Musculoskeletal disorders

Only two patients were recorded as having musculoskeletal disorders. This excluded the orthopaedic patients who required surgery.

Table 4.5: Musculoskeletal disorders

Musculoskeletal disorders	Frequency	Percent
No	132	98.5
Yes	2	1.5
Total	134	100

4.2.12 Blood pressure

Figure 4.8 indicates that 60.4% (n=81) of patients who had fallen suffered from primary or secondary hypertension. Primary hypertension is indicated in most cases of hypertension. In primary, or essential, hypertension, the condition originates within the patient's body; it is not due to a disease, and no cause for it can be determined. Secondary hypertension develops because of an existing condition or disease within a patient's body. It can also develop as a side-effect of various medications (Mohahan, Sands, Neighbors, Marek & Green, 2007:857).

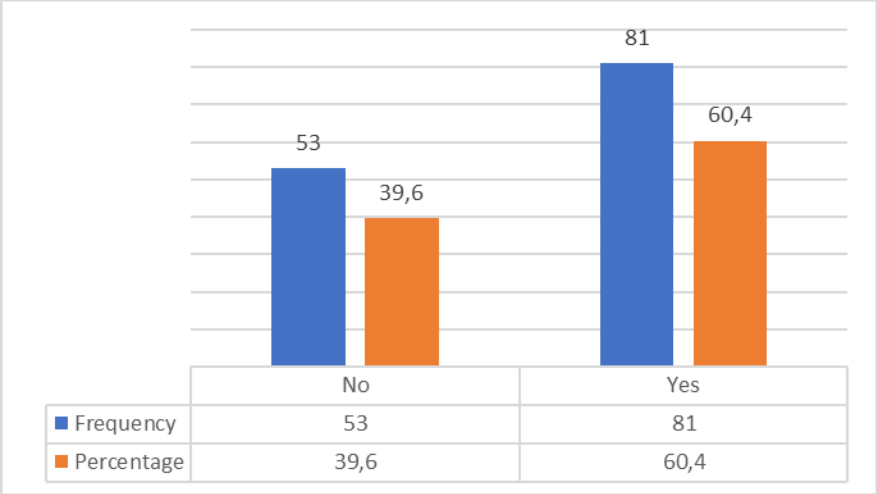


Figure 4.8: Blood pressure (n=134)

In this study, the mean age (72.3) of patients with hypertension was significantly higher compared to the mean age (62.4) of patients without a blood pressure problem (Mann-Whitney U, p=0.003). This is to be expected since high blood pressure is associated with age (Mohahan *et al*., 2007:857). Age may be an independent risk factor, but it can also be linked to a co-morbidity such as high blood pressure.

4.2.13 Medications

The results, as reflected in Table 4.6, indicate that 68.7% (n=92) of patients who had fallen had taken benzodiazepines prior to falling.

The use of benzodiazepines was not associated with age (Mann-Whitney U, p=0.57) or gender (X^2 df[1]=1.2, p=0.23). The total number of patients that received any medication prior to the fall was 134 (78.4%) and 29 (21.6%) did not receive any medication.

A smaller number (n=16; 11.9%) of patients had received anti-epileptic medication prior to falling. Hendrich (2007:53) maintained that patients who receiving anti-epileptic medications are at risk of falling.

Slightly more than a third of the patients (n=48; 35.8%) had received central nervous system (CNS) suppressing medication eight hours before they fell. This type of medication (schedule 4 and above) was administered to patients' post-procedure to relieve their pain. The investigation reports of the falls revealed that many of the patients who received medication that suppresses the CNS were unable to articulate what had happened to them.

Table 4.6: Medications

Medication	Options	Response n (%)
Benzodiazepines	Yes	92 (68.7)
	No	42 (31.3)
Anti-epileptics	Yes	16 (11.9)
	No	118 (88.1)
Other CNS suppressants	Yes	48 (35.8)
	No	86 (64.2)

4.3 SECTION TWO: EXTRINSIC FACTORS

In this section the extrinsic factors that contributed to patients' falls are discussed. In the research data extraction sheet the following aspects were covered:

a) environment, including furniture, wet floors, height of toilet seats,
b) availability of a call bell,
c) use of bedrails,
d) place where a fall occurred,
e) type of unit in which the falls occurred and staffing, and
f) injuries sustained and increase in the duration of hospitalization.

4.3.1 Environment

Included in the environment category are the furniture and equipment in the ward; wet floors; the height of the toilet; use of an assistance device; and footwear. Table 4.7 shows that furniture and equipment as well as cables and intravenous lines attached to patients were implicated in 13.4% (n=18) of the falls.

Wet floors accounted for 16 (11.9%) of the falls. The floors were wet because the patient concerned had either showered or urinated on the floor prior to the fall. Similarly, Hitcho *et al.* (2004:736) reported that 14 (8%) of the falls were due to wet floors. The height of the toilet did not play a significant role in the falls since only 3 (2.2%) of the falls were ascribed to the height of the toilet. These falls occurred in the orthopaedic ward where the patients involved may have misjudged the height of the toilet after undergoing surgery.

In seven (5.2%) of the cases, the patient fell despite using an assistance device, including a walking frame. Patients may have felt that they were strong enough to move about with a device without calling for assistance. Only one (0.7%) patient fell due to loose-fitting socks or shoes.

Table 4.7: Environment

	Options	Response n (%)
Furniture/attachments	Yes	18 (13.4%)
	No	116 (86.6%)
Wet floors	Yes	16 (11.9%)
	No	118 (88.1%)
Height of toilet	Yes	3 (2.2%)
	No	131 (97.8%)
Use of assistance device	Yes	7 (5.2%)
	No	127 (94.8%)
Loose shoes/socks	Yes	1 (0.7%)
	No	133 (99.3%)

4.3.2 Call bell

A call bell was available to 125 (93.3%) of the patients who had fallen. Five (3.7%) falls occurred in the passage and two (1.5%) in the dining room where no call bell was available. Figure 4.9 illustrates the availability of the call bell at the time of the reported falls.

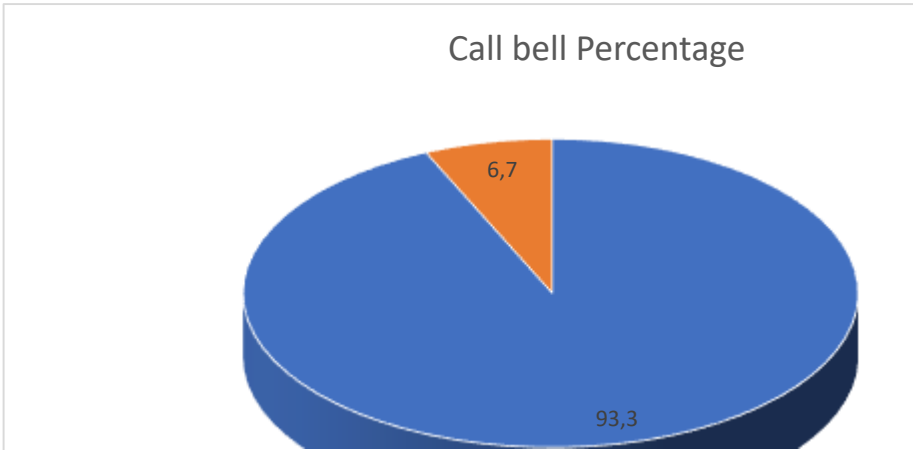


Figure 4.9: Percentages of call bell availability (n=134)

4.3.3 Bed rails

Table 4.8 depicts the use of bedrails. In most of the reported falls (n=82; 61.2%), the bedrails had not been used. This includes the 11 mental health patients whose beds in the mental unit do not have rails.

Table 4.8: Bed rails (n=134)

	Options	Response n (%)
Bed rails used (including beds in the mental health unit that do not have bedrails).	Yes	52 (38.8%)
	No	82 (61.2%)

Furthermore, Figure 4.10 shows that for this study, 49 (94.2%) of the patients who had fallen from a bed where bed rails were used, had in fact climbed over the rails.

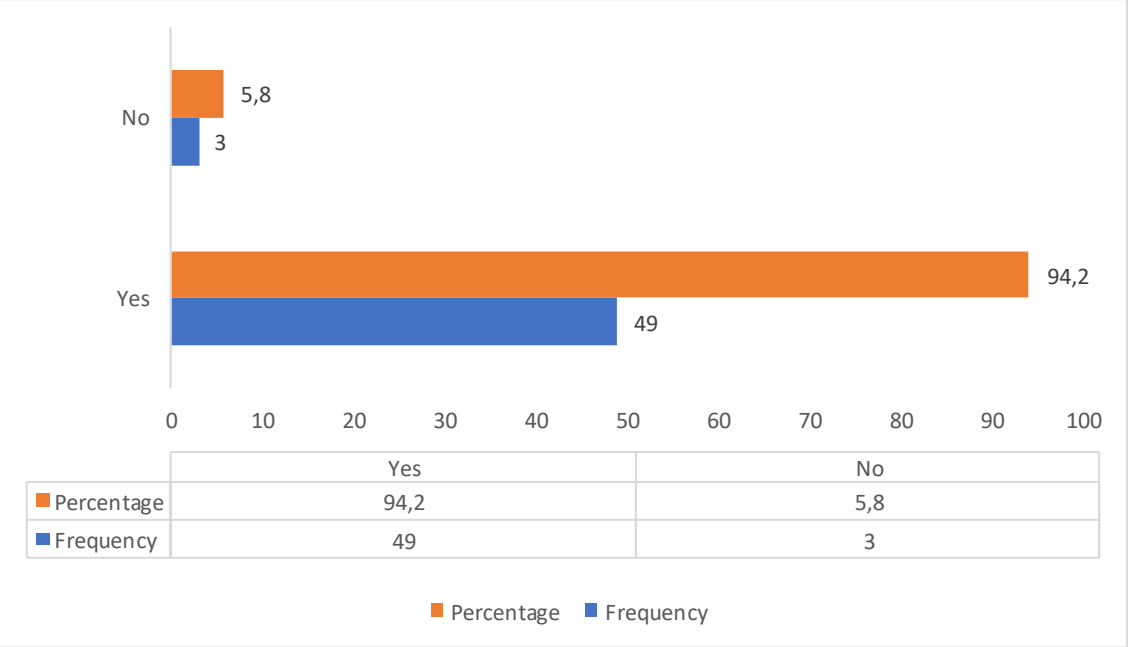
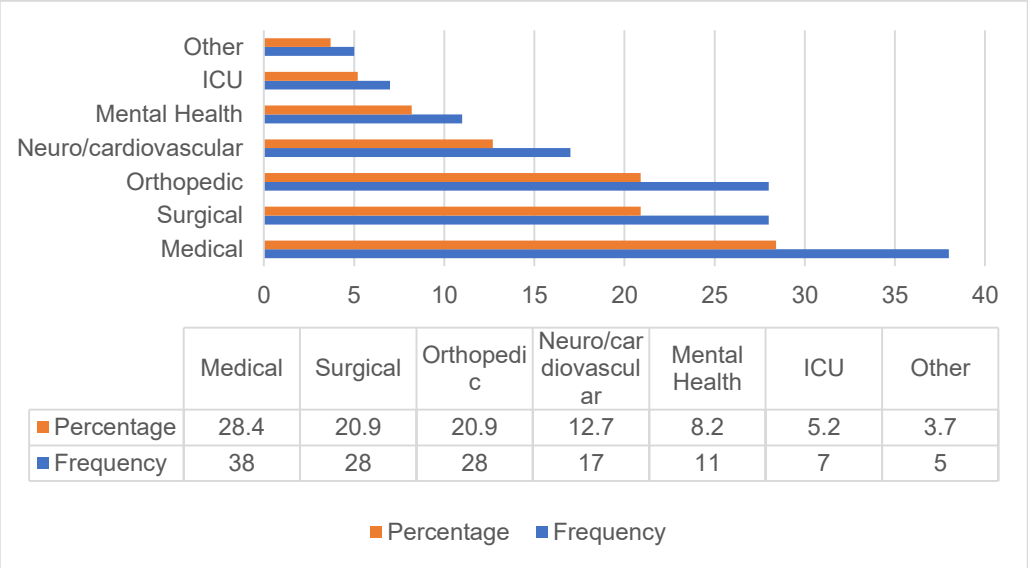


Figure 4.10: Climbing over the rails (n=52)

4.3.4 Hospital unit per discipline

Figure 4.11 illustrates the units where the falls occurred. Most of the falls occurred in the medical unit (n=38; 28.4%), followed by an identical number of falls in the surgical and orthopaedic units (n=28; 20.9%). In the neuro/cardiovascular unit 17 (12.7%) falls occurred; 11 (8.2%) in the mental health unit; 7 (5.2%) in the intensive care unit (ICU), and 3.7% (n=5) occurred in other areas.

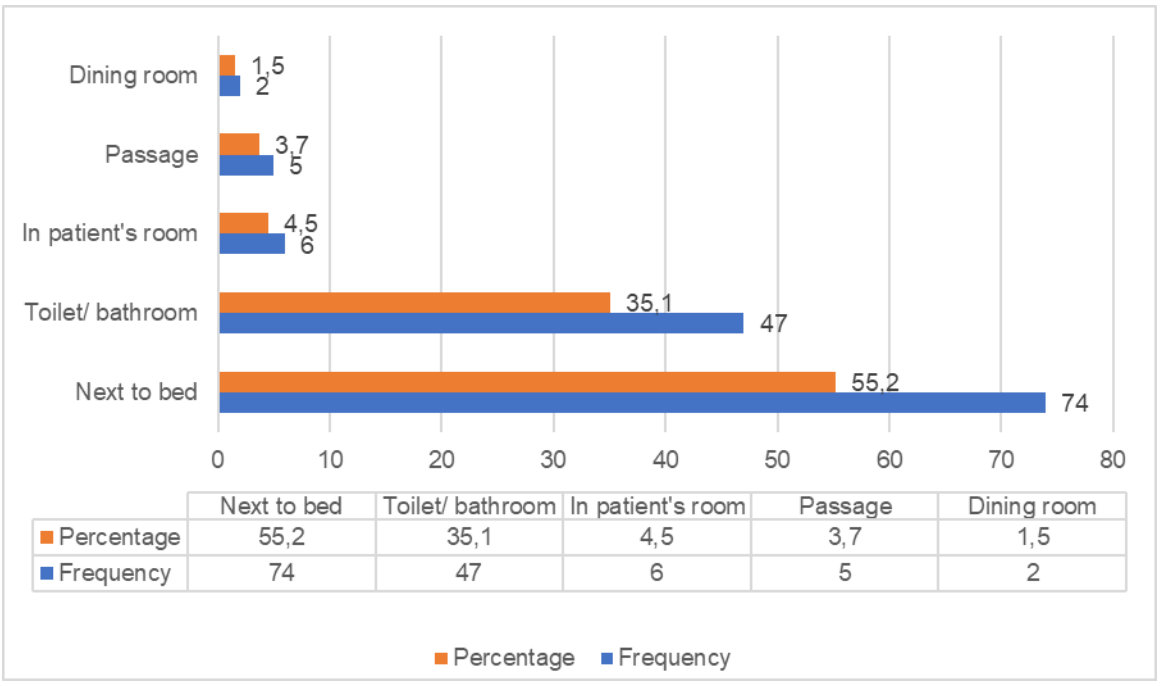


	Medical	Surgical	Orthopedic	Neuro/cardiovascular	Mental Health	ICU	Other
Percentage	28.4	20.9	20.9	12.7	8.2	5.2	3.7
Frequency	38	28	28	17	11	7	5

Figure 4.11: Unit discipline (n=134)

4.3.5 Area of falls

Information in Figure 4.12 represents the area or place where the falls relevant to this study occurred. The majority of the patients fell next to his or her bed (n=74; 55.2%), followed by falls in the toilet or bathroom (n=47; 35.1%); in the patient's room (n=6; 4.5%), in a passage (n=5; 3.7%), and lastly in the dining room (n=2; 1.5%).



	Next to bed	Toilet/ bathroom	In patient's room	Passage	Dining room
Percentage	55,2	35,1	4,5	3,7	1,5
Frequency	74	47	6	5	2

Figure 4.12: Area of fall (n=134)

4.3.6 Staffing at time of the fall

Table 4.9 indicates the descriptive statistics for the number of nurses on duty at the time of the falls. On average the staffing skill mix included one registered nurse, at least two enrolled nurses and enrolled nursing auxiliaries, and one caregiver on duty. The data in table 4.9 refer to a maximum of 7 registered nurses on duty per shift which was the case in the intensive care unit.

Table 4.9: Nursing skill mix at the time of the falls

	N	Minimum	Maximum	Mean	Std. Deviation
Registered nurse	134	1	7	1.50	1.129
Enrolled nurse	134	0	6	2.38	1.082
Enrolled nurse auxiliary	134	0	4	2.17	.946
Caregiver	134	0	3	1.01	.804

Table 4.10 illustrates that in most cases (n=131; 97.8%), the staffing at the time of a fall was adequate for the number of patients. The three (2.2%) cases where inadequate staffing was noted, the patients concerned were confused and no staff had been specifically allocated to them.

Table 4.10: Staff on duty

	Options	Response n (%)
Adequate staffing	Yes	131(97.8%)
	No	3 (2.2%)

The average bed occupancy in the units of the two hospitals at the time of the study was 64.32% across all the disciplines, including the intensive-care units.

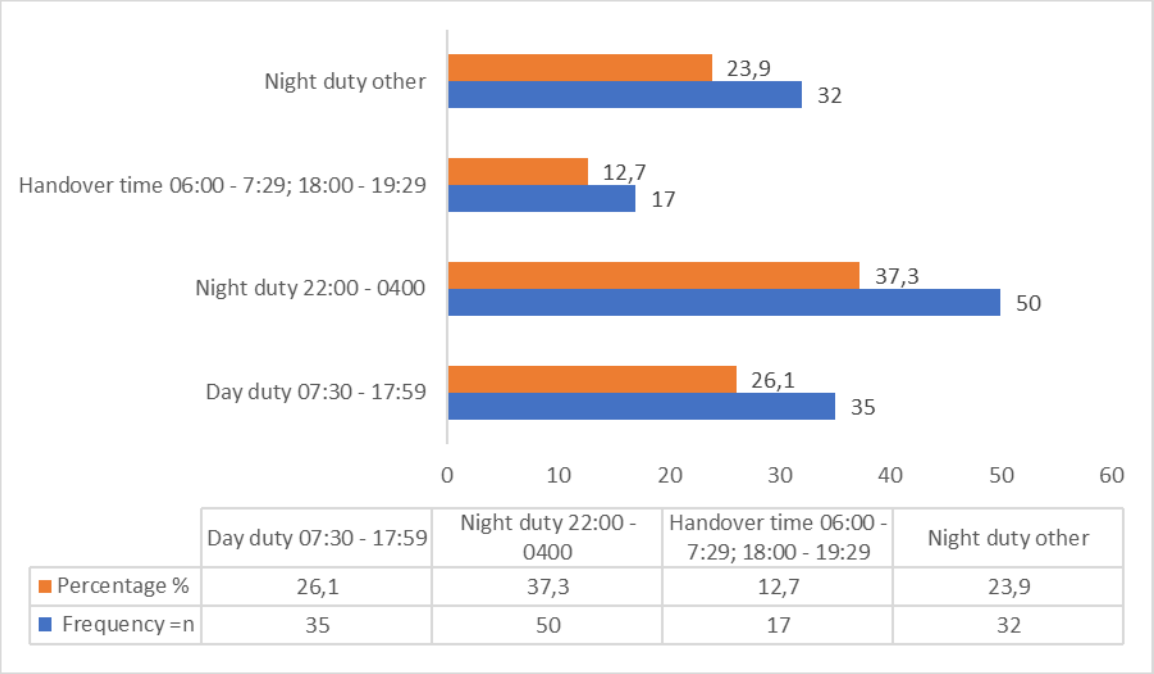
4.4 SECTION 3: PATIENT FALLS

In this section actual falls are discussed with reference to the time of the fall, type of fall and injuries sustained, as well as use of the Hendrich II assessment tool completion on admission and just prior to the fall.

4.4.1 Time of the fall

Figure 4.13 illustrates the times of the falls. The results indicate that most of the falls, 82 (61.2%), occurred at night. In the hospitals where the study was conducted, the night schedule starts at 19h00 and ends at 07h00. For the purposes of this study, the night schedule was divided into two stages: (a) night duty: 22h00–03h59 during which 50 (37.3%) falls took place, and (b) night duty other: 19h30–21h59 and 04h00–05h59 during which 32

(23.9%) occurred. This division is based on the more frequent nursing activity and greater visibility that take place during the time marked as night duty other. Thirty-five (26.1%) falls happened during the day-time period (07h30–17:59), while 17 (12.7%) occurred during handover time (06h00–07h29 and 18h00–19h29) when fewer nursing staff are visible in the patient rooms since handover takes place in the corridor or at duty stations.

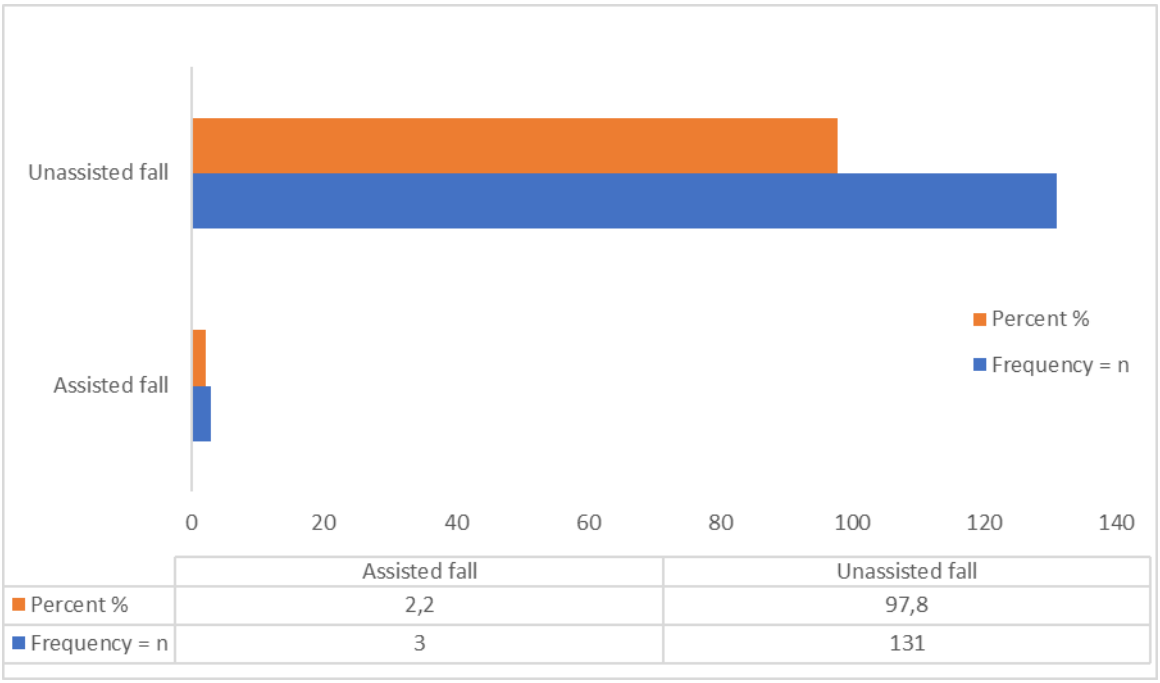


	Day duty 07:30 - 17:59	Night duty 22:00 - 0400	Handover time 06:00 - 7:29; 18:00 - 19:29	Night duty other
Percentage %	26,1	37,3	12,7	23,9
Frequency =n	35	50	17	32

Figure 4.13: Times of falls (n=134)

4.4.2 Type of fall

From Figure 4.14 it can be deduced that in most cases unassisted falls (n=131; 97.8%) occurred.



	Assisted fall	Unassisted fall
Percent %	2,2	97,8
Frequency = n	3	131

Figure 4.14: Unassisted/Assisted falls (n=134)

4.4.3 Injuries

Figure 4.15 shows the number of patients who sustained injuries following a fall. In the majority of cases 98 (73.1%) no injuries were sustained, but 24 (17.9%) sustained minor injuries; 7 (5.2%) sustained moderate injuries, and 5 (3.7%) sustained major injuries. Only 6 (4.5%) of the patients concerned were subsequently obliged to spend more time in hospital. No deaths due to falls were reported in this study. The injuries sustained during the falls classified as “major” included a fractured head or femur, orbital and humerus fractures, as well as concussion. This corresponds with the classification of major fall injuries discussed in Chapter 1, Table 1.1. No association could be found between gender or age and the severity of the recorded injury.

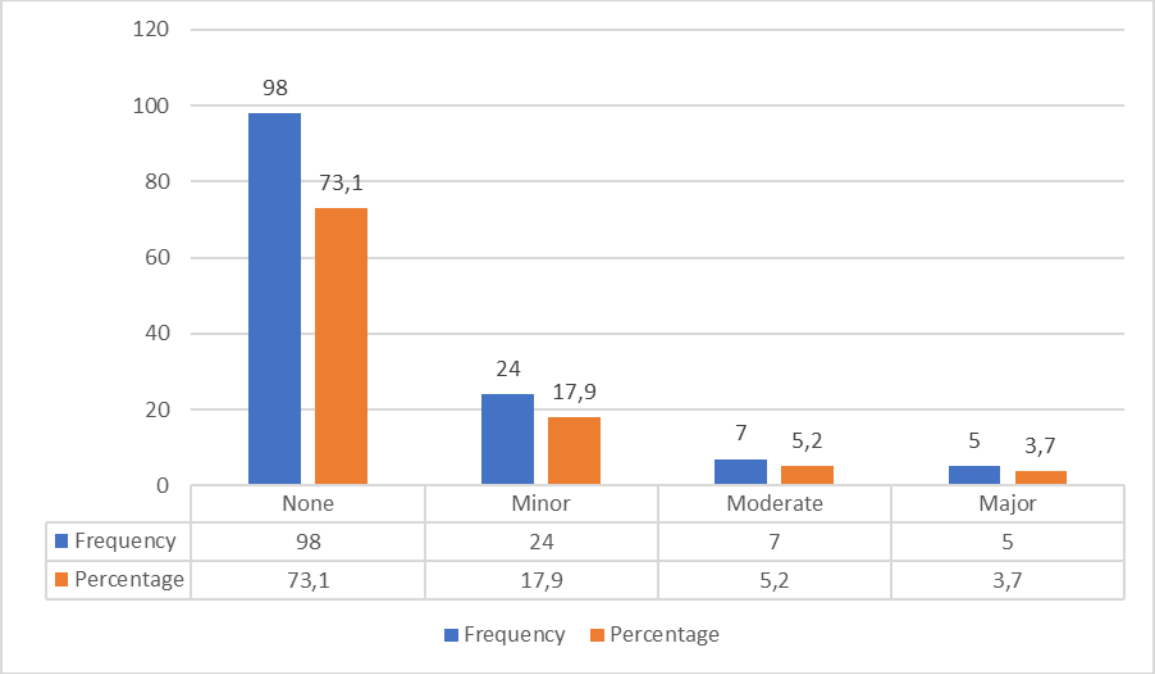


Figure 4.15: Injuries (n=134)

4.4.4 Hendrich assessment on admission

Table 4.12 shows the assessments performed on admission. A total of 86 (64.2%) of the patients implicated in this study had been assessed on admission, in contrast with more than a third (n=48, 35.8%) who had not been assessed on admission.

Table 4.11: Assessment on admission

	Options	Response n (%)
Assessment on admission	Yes	86 (64.2%)
	No	48 (35.8%)

4.4.5 Assessments performed prior to falling

Table 4.12 illustrates that 85 (63.4%) of the patients who fell had been assessed prior to the fall, in contrast with 49 (36.6%) patients who had not been assessed prior to the fall. These assessments refer to the fall risk assessments that need to be done as per protocol, on admission and after each shift change every 12 hours, by the registered nurse or delegated person. Only 68 (50.70%) of patients that fell were assessed both on admission and prior to the fall as per the protocol.

Table 4.12: Assessment prior to falling

	Options	Response n (%)
Assessment prior to fall	Yes	85 (63.4%)
	No not done	49 (36.6%)
Assessment performed on admission and prior to falling	Yes	68 (50.7%)
	No not done	66 (49.3%)

As depicted in Table 4.13, four of the five patients who sustained major injuries had not been assessed on admission or before they fell. Thus not following the protocol of the hospital group.

Table 4.13: Cross-tabulation of risk assessment performed as per protocol vs. injury severity

			Type of injury				
			None	**Minor**	**Moderate**	**Major**	**Total**
Hendrich done as per protocol	No	Count	45	13	4	4	66
		% within type of injury	45.9%	54.2%	57.1%	80.0%	49.3%
	Yes	Count	53	11	3	1	68
		% within type of injury	54.1%	45.8%	42.9%	20.0%	50.7%
Total		Count	98	24	7	5	134
		% within type of injury	100.0%	100.0%	100.0%	100.0%	100.0%

Additional analysis was conducted by means of an ordinal logistic regression to estimate the odds ratio of being in a higher injury category, based on whether a risk assessment was performed according to protocol. This indicated that having a Hendrich assessment performed according to protocol is significantly correlated with a lower risk of sustaining a more severe injury when compared with the adjacent injury category (p=0.018: odds ratio = 0.42; 95% 0.20 to 0.86). In other words, the risk of a more severe fall increases 2.4 times if a risk assessment is not performed.

Table 4.14 indicates the descriptive statistics of the documented Hendrich II risk scores. Mean scores were below 5, indicating that on assessment most people did not have a fall risk. This is confirmed in Table 4.15.

Table 4.14: Descriptive statistics of Hendrich II fall risk score

	n	Minimum	Maximum	Mean	Std. Deviation
Hendrich II score on admission	86	0	12	3.41	2.605
Hendrich II score before fall	85	1	14	4.16	2.703
Valid N (list wise)	68				

Table 4.15: High vs. low risk on admission and before the fall

At admission	No risk [score <5] n (%)	High risk [score > 5] n (%)	Total n (%)
At admission	64 (74.4)	22 (25.6)	86 (100)
Before fall	57 (67.1)	28 (32.9)	85 (100)

Table 4.16 indicates the Hendrich score on admission categories across categories of injury severity. There was no association between the score on admission (Fishers Exact, p=0.30), before the fall (Fishers Exact, p=0.54) and injury severity. However, it is apparent that in the case of the 12 moderate or severe injuries, only one had been assessed as a fall risk on admission, and only four cases had been assessed as a fall risk before the fall.

Table 4.16: Cross tabulation of Hendrich score category vs. injury severity

			Type of injury		
			None/ Minor	Moderate/ Major	Total
Hendrich score on admission	Not done	Count	41	7	48
		% within Type of injury	33.6%	58.3%	35.8%
	0-4	Count	60	4	64
		% within Type of injury	49.2%	33.3%	47.8%
	>5	Count	21	1	22
		% within Type of injury	17.2%	8.3%	16.4%
Total		Count	122	12	134
		% within Type of injury	100.0%	100.0%	100.0%
Hendrich score before fall	Not done	Count	45	4	49
		% within Type of injury	36.9%	33.3%	36.6%
	0-4	Count	53	4	57
		% within Type of injury	43.4%	33.3%	42.5%
	>5	Count	24	4	28
		% within Type of injury	19.7%	33.3%	20.9%
Total		Count	122	12	134
		% within Type of injury	100.0%	100.0%	100.0%

4.5 SUMMARY

In this Chapter, the findings of the study concerning intrinsic and extrinsic risk factors, and details about patient falls were discussed. The data was presented in tables and graphs and were accompanied by explanatory comments. Analysis of the data was done by means of the SPSS package. All objectives of the study were met. In the following chapter, the findings will be discussed according to the objectives of the study, and where appropriate, recommendations will be made.

CHAPTER 5
DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

In Chapter 1 the rationale for and background to this study were presented. Chapter 2 provided an in-depth review of available literature on patient falls; reasons for falling; consequences of the falls, and possible preventative measures. Chapters 3 and 4 focused on the methodology, and the analysis and interpretation of the data respectively. In this final Chapter conclusions emerging from analysis of the data as well as recommendations are discussed. The limitations of the study also receive attention.

5.2 DISCUSSION

The aim of this study was to determine the factors that influence patient falls in private hospitals in the Cape Metropole of the Western Cape. The following objectives are discussed with reference to the analysis in Chapter 4 and the literature:

- determining the intrinsic factors that contribute to patient falls
- determining the extrinsic factors that contribute to patient falls
- classifying the severity of the injuries sustained during patient falls, and
- determining whether failure by nurses to conduct a fall-risk assessment contributed to patient falls.

The extent to which of each of these objectives was achieved, is discussed below.

5.2.1 Objective 1: To determine the intrinsic factors contributing to patient falls

To achieve this objective, various intrinsic factors relating to patient falls, as incorporated in the conceptual framework, were discussed. Intrinsic factors form part of the structural component in the framework that concerns patient characteristics. The factors that received attention are: age, gender, co-morbidities, urinary irregularities, mental state and sensory disturbances, blood pressure, and the use of benzodiazepines and other medications.

5.2.1.1 Age

As stated in section 4.2.1, the mean age of all the patients involved in this study was 68.37 years. The mean age of the men who fell was 71.8 years, in comparison to the mean age of the women, namely 65.2 years. As noted in Chapter 1, because of its location in an area

populated by retirement homes and frail-care facilities, patients from hospital A (85 patient falls included in the data) tended to be older.

It is, therefore, to be expected that the mean age in this sample would be higher than the ages in similar studies reported in the literature. For example, in the study by Watson *et al.* (2015:89), the mean age of patients was 65 years. Hitcho *et al.* (2004:734) found that the mean age was 63.4 years and the age ranged from 17 to 96 years. Staggs *et al.* (2014:4) in turn, found that the average age was 65.3 years, while in a report for the Royal College of Physicians, Vasilakis, Schoo, O'Riordan, Rai, Stanley and Barker (2015:35) stated that the age range of the participants implicated in their study was 65 to 106 years. The mean age in this audit was 80.4 years.

It is generally accepted that with aging, the human body changes and movement becomes more difficult. People above the age of 65 years generally have difficulty moving about, performing the activities of daily living, and caring for themselves (Watson et al 2015:89). Elderly patients above the age of 65 years may also misperceive their capabilities, believe that they can continue to care for themselves, and have a strong desire not to burden others for assistance (Watson *et al.*, 2015:89).

The Hendrich II assessment tool does not include the age of patients as a risk factor, which may be a limitation of the tool since it does not identify older patients as being at risk of falling. The Johns Hopkins tool includes the age of 60 and above as a risk factor, with the risk increasing for every 10 years thereafter.

In the context of this study, an age above 65 years should be added as a risk factor when nursing assessments are made.

5.2.1.2 Gender

Evident in this study was that more women than men fell. The percentage of women who fell was 52.2% (section 4.2.2), which corresponds with the data in studies conducted by Hitcho *et al.* (2004:734), since they also found that women (n=97, 53%) were more inclined to fall. Rafferty *et al.* (2010:5) also noted that more women (51.9%) fell when compared to men. Similarly, Vasilakis et al. (2015:35) reported that 54% of the patients who fell were women. In contrast, however, Staggs *et al.* (2014:5) found that men had a higher risk of falling when compared to women since men are more reluctant to request assistance with mobilization than women. This might be because men tend to overrate their capacity, ability and physical strength.

In this study, a particular gender was not identified as at risk for falling. However, this does not correspond with the recommendations that Hendrich (2007:53) and her colleagues incorporated in the Hendrich II fall risk assessment form. They recommended that because of their finding that men generally have a higher risk of falling, all men receive a score of 1. This could potentially lead to women being overlooked or wrongly classified as having a low risk of falling. Neither the Morse fall risk assessment tool nor the Johns Hopkins tool assesses gender as a factor in falling.

5.2.1.3 Co-morbidities

As mentioned in section 4.2.3, a very small percentage of patients (19.4%) had no co-morbid conditions. From the research data it was evident that most patients (80.6%) had one or more co-morbid condition. Watson *et al.* (2015:88) noted that patients with multiple diseases had an increased risk of falling and concluded that the risk of falling increases in patients with a primary medical condition and more than one secondary condition.

Secondary diagnosis includes, but are not limited to, diabetes, hypertension, pulmonary disease, and heart failure. The diagnosis classification of the patients who fell in this study included orthopaedic surgery (hip and knee replacements), general surgery, medical conditions (pneumonia, diabetes mellitus, kidney disease, and cerebro-vascular accidents) and cardio/thoracic surgery.

The Hendrich II tool does not include co-morbidities as a fall-risk factor. The Morse risk assessment tool makes provision for the inclusion of a secondary diagnosis as part of assessment, which increases the fall risk by 25 points and places a patient in a low-risk category requiring standard fall-prevention measures. In the context of this study, it might be advisable to include a secondary diagnosis as a risk factor.

In this study, a prior history of falls was reported in 2.2% of cases. Vasilakis et al. (2015:40) reported that 81.2% of the patients involved in their study reported they had fallen prior to admission. The Hendrich II assessment tool does not include previous falls as a risk factor (Hendrich, 2007:56). A history of previous falls is not recorded on admission as it is not part of the risk assessment tool, hence this could have been missed by the staff.

5.2.1.4 Urinary irregularities

Urinary irregularities are regarded as a risk factor, because of the mobility of patients to and from the toilet. None of the patients in this study had frequency with six (6) patients (4.5%) having incontinence (section 4.2.7).

Despite elimination being a normal need of patients to go to the bathroom, the risk assessments should be done to exclude factors that can impact on the patient such as dizziness, hypertension and other medications used. Hitcho *et al.* (2004:735) could not find any relationship between urinary irregularities and patient falls. In contrast, Hendrich (2007:52) notes that urinary irregularities, including frequency and incontinence, play an important part in patient falls. Elimination is included in both the Johns Hopkins and Hendrich II assessment tools. The literature clearly indicated that urinary irregularities contributed to patient falls. Hendrich (2007:52) referred to the altered elimination of patients. This includes urinary frequency, incontinence, catheterization and dialysis.

Noteworthy is the fact that although urinary irregularities were not found to be a significant contributor to falls in this study, several falls occurred due to patients mobilizing to the bathroom or toilet. A total of 47 (35.1%) patients fell in the bathroom or toilet, whilst 55.2% of patients fell next to the bed whilst mobilizing to the toilet. This concerns patients' basic needs as stated in the patients' reports following the fall. In their study about hourly rounding, Goldsack, Bergey, Meredith, Mascioli, and Cunningham (2015:25) found that when staff did hourly rounding in the patient units, the fall rate reduced in the unit. The purpose of hourly rounding would be to monitor and assist patients that might need to go to the bathroom therefore preventing self-mobilization and potential falls.

5.2.1.5 Blood pressure

Hypertension (high blood pressure) was indicated for a number of patients, the numbers being similar to the number reported in the study by Watson *et al.* (2015:88). Figure 4.8 shows that 60.4% or 81 patients had hypertension. Watson et al. (2015:89) stated that patients who take anti-hypertensive medication have an increased risk of falling. In their study, Hitcho *et al.* (2004:734) noted that 34.4% of the patients who had received anti-hypertensive medications had fallen in hospital.

Hypertension could be age-related since, as mentioned previously (see section 5.2.1.1 above), the mean age of participants in this study was relatively higher than the mean ages reported in other studies. Hypertension is a common age-related condition or co-morbidity. As noted above, the mean age (68.37 years) of the study sample indicated an older population, which may explain the high incidence of hypertension.

None of the fall risk assessment tools discussed in this study, assessed blood pressure-related risk among patients. The Johns Hopkins tool identifies the use of anti-hypertensive medication as a risk factor. In this study, with the high percentage of patients that had hypertension, this should be added as a risk factor to alert the staff of the risk of falling.

5.2.1.6 Sensory disorders and mental state

Sensory disturbances did contribute to patient falls in this study. Figure 4.7 shows that 32.5% (n=44) of the patients suffered from confusion, delirium, depression and dementia. This included the 11 patients that fell in the psychiatric unit. If all assessments were done accurately on admission as well as prior to the fall on each shift change, the mood of patients could have been detected and preventative measures put in place to prevent the fall. According to Vasilakis *et al.* (2015:40), 36.7% of the patients who were audited had received a diagnosis of delirium. Hitcho *et al*. (2004:734) stated that 44.3% of patients who fell were recorded as suffering from a mental disorder.

The Hendrich II tool assesses for confusion, disorientation and impulsivity of patients, while the Morse tool assesses whether a patient is aware of his or her ability and limitations. The Johns Hopkins tool assesses a patient's cognition. This includes an awareness of the environment, impulsivity and importantly, an understanding of own limitations, both physical and cognitive. Factors that could be included in a risk assessment tool are whether the patient is aware of his or her own limitations in terms of mobility as well as confusion due to various causes. This could be medication, age or disease driven for example delirium and dementia.

5.2.1.7 Medications

Medication administered to patients prior to the fall was identified as a contributing factor in patient falls. As reported in section 4.2.13, a high number of patients that fell (68.7%) had received a dose of benzodiazepines within an 8-hour period before they fell. In this study, it was found that Stillnox (zolpidem tartrate) was also predominantly administered to patients. Stilnox is indicated for the treatment of insomnia. Its effects are similar to that of benzodiazepines, but its structure and molecular components are different (Moore & Mattison, 2018:1275).

According to the incident reports, many of the patients concerned stated that they did not remember mobilizing prior to falling. Some patients urinated next to the bed and others wrongly perceived the curtains to be a wall or rail. This is a typical side effect of zolpidem tartrate (Moore & Mattison, 2018:1275). In the leaflet of the medication Sanofi – Aventis (2018) cautions that the use Stillnox leads to hallucinations and memory loss.

Other central nervous system (CNS) medications were administered to 48 (35.8%) of patients within the eight hours prior to the fall. This includes medications used for pain management and includes morphine, pethidine, oxynorm, Stillpayne, targinact and Temgesic. Of importance in this study is that 50 (37.3%) patients fell between 22h00–04h00.

Sedatives are routinely administered between 21h00–22h00 daily. This corresponds with information in the literature as for instance, Hitcho et al. (2004:734) and Watson et al. (2015:89) identified that medication suppressing the CNS is a fall risk factor for patients. Hitcho *et al.* (2004:735) stated that more patients fell at night after receiving sedatives. This could be due to the effect of the sedatives on the body. Hitcho et al. (2004:734) further stated that 55.7% of patients involved in their study had taken benzodiazepines or some other central nervous system depressants prior to the fall, which therefore, occurred at night.

The CNS is responsible for processing and controlling most bodily functions and consists of the nerves in the brain and spinal cord. These functions are suppressed by the administration of medications, this is indicative of the number of patients that fell within eight hours of receiving this medication. Due to medications being a contributing factor in patient falls in this study, it would be advisable to add any CNS depressing medication as a risk factor to the assessment of patients. Currently only the benzodiazepine and anti-epileptic medication form part of this assessment.

The intrinsic factors related to patient falls were discussed as per the findings of the study and this objective has been achieved with the data presented.

5.2.2 Objective 2: To determine the extrinsic factors that contribute to patient falls

The second objective aimed to determine the extrinsic factors that contributed to patient falls – the external factors that play a role in falling. They include the environment and refer to the structural component of the conceptual framework used in this study. Factors that will be discussed include the environment, flooring, patient- assistant devices, call bell, bed rails, as well as the staff skill mix.

5.2.2.1 The environment

In Chapter 4, environmental factors were shown to contribute to the falls of 18 (13.4%) patients. This includes falls involving ward furniture or equipment, for example, patients tripping over the cords of equipment. Floors that were wet, either because the patient had showered or urinated on the floor, played a role in 11.9% of falls. However, it was noted that some of the patients who wet themselves were confused and did not realize what they were doing. Similarly, Hitcho *et al.* (2004:736) reported that wet floors did not play a significant part in falls, and only 6% of the falls relevant to their study were related to either water or urine on the floors. This is a slightly lower percentage than the aforementioned percentage for this study. Use of patient-assistant devices as a risk factor was relevant in only 5.2% patient falls.

5.2.2.2 Call bells and bed rails

A **call bell** was available for all but three patients prior to the fall. It was not possible to determine whether or not patients used the call bell as this was not included in the data extraction sheet and not recorded in nursing notes. However, according to some of the incident reports, patients did not want to bother the nursing staff by using the call bell. Bed rails had been raised in the case of 52 (38.8%) patients, and 49 (94.2%) of these patients had climbed over the bed rails. Hitcho et al. (2004:736) note that only in 3% of the cases implicated in their study had the call bell been used prior to the fall. Approximately 24% of these patients said they thought they did not need assistance to become mobile and therefore did not call for assistance. This corresponds with a finding of the present study, namely that, according to the incident reports written by the nursing staff, patients had stated that they did not want to disturb the nurses and felt they were able to become mobile on their own.

Hignett and Masud (2006:608) report that there is no clear evidence that raised **bed rails** prevent patients from falling, and instead suggest that the bed should be lowered to a height where a patient can actually touch the ground while lying on the bed. This would also reduce the severity of injuries should a patient fall (Hignett & Masud, 2006:609). In their study Hignett, Sands, Youde and Griffiths (2010.4) reported the same. There is still no evidence that bedrails prevent falls or cause injury.

In this study, five (5) of the 12 moderate and major injuries occurred where patients climbed over the bed rails, including three (3) of the five (5) major injuries sustained. A high percentage of patients (81.6%) that climbed over the bedrails received benzodiazepines, although a significant association could not be found. More than half of the patients (57.1%) climbed over the bedrails in the time frame between 22:00 and 04:00 on night duty. In order to assess the value of bedrails, a study needs to be conducted with a comparison group of patients that did use the bed rails and did not fall.

5.2.2.3 Hospital unit and area of fall

As per section 4.3.4, more falls occurred in the medical units followed by the surgical units. Falls in the medical units calculated to 28.4% of all falls. This corresponds with information in the literature, notably in the report by Watson *et al.* (2015:88) who stated that many of the falls occurred in the medical units, followed by falls in surgery, and then by falls in the neurological and cardiac units. Similarly, Vasilakis *et al.* (2015:35) reported that medical patients contributed to 57.3% of the falls in their study, surgical patients to 22.3%, and patients in other categories to 20.4%. In a study done in Norway by Lerdal, Sigurdsen, Hamerstad, Granheim and Gay (2018:1826), it was found that the majority of falls were in

the medical wards. They found that symptoms of nausea, diarhoea, and sleep problems related to the increase in falls of these patients.

The areas where the majority of falls occurred was 55.2% next to the bed, followed 35.1% in the bathroom. Hitcho *et al.* (2004:735) reported that a high percentage of falls (n=155; 84.7%) occurred in the patients' rooms, while 20 (10.9%) happened in the bathroom and 8 (4.4%) in other areas. Hignett *et al.* (2010:2) found in their study that the majority of falls happened at the bed of the patient and the second highest area of fall was in the bathroom. This corresponds with the results of the present study.

5.2.2.4 Staffing at the time of a fall

Although the number of staff at the hospitals met the specifications of the company staffing model, the skill mix is questionable. The staffing model applied in the hospitals allows for 25% registered nurses (RNs), 35% enrolled nurses (ENs) and 40% enrolled nursing auxiliaries (ENAs) to be on duty per shift. The staffing levels for an intensive–care unit allow for 70% RNs, 20% ENs, and 10% ENAs. This is calculated on the basis of patient acuity and the number of patients in a unit. No provision is made for the caregiver category, despite the hospitals' use of caregivers to assist in basic nursing care.

As discussed in section 4.3.6, the average registered nurses on duty was 1.50 per shift; 2.38 for ENs; 2.17 for ENAs, and 1.01 for caregivers. It should be kept in mind that this included the intensive-care units where more registered nurses are generally on duty. The median registered nurse in this study per shift was one, although certain surgical and orthopaedic units reportedly had two RNs on duty per shift during the day. This is concerning since some of the units had up to 44 beds with an average occupancy of 64.3%. According to Aiken *et al.* (2016:1) the rate of adverse events among patients drops significantly with an increase in registered nurses. However, in their study, Bouldin et al. (2014:5) noted no trend between patient falls and the staffing level.

In their study in various countries in Europe, Aiken *et al.* (2016:7) found that where a 10% increase in RNs was introduced, an 11% reduction in adverse events was observed. Aiken *et al.* (2016:2) noted that the hospital skill mix varies between countries. Regarding RNs in general units, Germany is on 82%, England on 57%, and Spain on 54%. These figures imply a far higher registered nurse–patient ratio compared to the hospitals involved in this study in the Western Cape.

Furthermore, Aiken *et al.* (2016:2) noted that a greater number of mortalities are associated with the use of nursing auxiliaries. They added that if higher proportions of RNs are used,

the possibility of burnout among nursing staff decreases (Aiken *et al.*, 2016:7). In the conclusion to their study, Aiken *et al.* (2016:8) noted that caution should be taken when substituting a registered nurse with an auxiliary since this might lead to higher costs due to the possible incidence of adverse events and an associated increase in hospitalization of patients following such an event. In order to determine if staff skill mix is associated with patient falls, a larger study sample that compares staffing levels and fall incidence needs to be conducted, as per the studies done by Aiken *et al*. (2016:8).

Hitcho *et al.* (2004:735) reported that most falls (n=107; 58.5%) occurred during the 19h00–06h59 time frame. This corresponds with a finding of the present study. Watson *et al.* (2015:88) found that the highest number of patients fell during the 10h00–12h00 time frame, a situation they ascribe to various investigations that take place in that period, thereby reducing the nursing hours. They also commented that more falls were reported during the night-duty time frame of 01h00–02h00, which may have been due to the smaller number of nursing staff on duty at night (Watson *et al.* 2015:89).

The findings of the extrinsic factors were discussed, and this objective has been achieved with the data presented and the literature confirming similar findings.

5.2.3 Objective 3: To classify the severity of the injuries sustained during patient falls

Objective 3 refers to the injuries sustained as a result of a fall. In the conceptual framework this constitutes part of the outcomes. Classification of the injuries was discussed earlier in the study (see section 4.4.3), consequently here only the findings are discussed.

Most of the falls relevant to this study were unassisted (97.8%). This corresponds with information in published reports which stated that more unassisted than assisted falls took place, for instance Staggs *et al.* (2014:358) noted that 85.5% of the falls reported in their study were unassisted, while Hitcho *et al.* (2004:735) commented that in their study they found that 145 (79.2%) were unassisted falls and 15 (8.2%) were assisted falls. The percentage of unassisted falls is, therefore, higher in this study when compared with falls reported in the other studies.

The majority of the patients that fell were uninjured, and no deaths from injuries following a fall were reported. “No injuries” equated to 98 (73.1%) of the falls. There were 24 (17.9%) minor injuries, seven (7) (5.2%) moderate injuries, and five (5) (3.7%) major injuries. Watson *et al.* (2015:86) noted that 2 793 (70%) of the falls documented in their study were not accompanied by injuries (levels 1 and 2); level 3 or moderate injuries accompanied 2 179

(29%) falls; level 4 or major injuries were recorded for 80 (1%) of the falls, while level 5 or death occurred in the case of 16 (0.20%) of the reported falls.

The patients who sustained minor injuries required minimal intervention and treatment. Moderate injuries were treated by means of a supporting bandage or a dressing applied to lacerations if no suturing was required. The major injuries that were sustained were a fractured head or femur, an orbital fracture, humerus fracture, or concussion following a fall on the head. As mentioned previously, three of these patients climbed over the bed rails and most importantly the risk assessments were not completed for four of the five major injuries as per protocol. The patients concerned were obliged to remain in hospital longer and were subject to secondary treatment plans to manage the injuries. However, all the patients involved made full recoveries. The study did not include the calculation of monetary value of the increased length of stay to the patients. Nurses not following the protocol related to patient safety is a concern and needs to be corrected as per the recommendations later in the chapter.

This objective – to classify the severity of the injuries sustained during falls has been achieved and substantiated with the literature.

5.2.4 Objective 4: To determine whether failure by nurses to conduct a fall-risk assessment contributed to patient falls

Objective 4 relates to the process phase of the conceptual framework and refers to patient assessments by nursing staff. In determining the fall risk of any patient, a proper assessment should be performed. In the two hospitals involved in this study, the Hendrich II assessment tool is used to determine the fall risk of patients. The findings of this study relating to the assessments done in the hospitals (as discussed in Chapter 4) are perturbing. Only 68 (50.7%) patient assessments were conducted as per protocol, namely on admission and at each shift change. Four of the five patients that suffered major injuries had not been assessed, not on admission or at shift changes. Regression analysis indicates that the risk of a more severe fall increases 2.4 times in the absence of a risk assessment.

The assessment should be done by registered nurses or could be delegated to another category if the registered nurse confirms the findings and countersigns the nursing plans for the patient concerned. This is according to the regulations related to the scope of practice of registered nurses (Republic of South Africa, 1984:1). However, with due regard for the staffing skill mix of the units, it might not have been possible for the registered nurse to confirm the findings because of time constraints and other urgent duties as well as being the only registered nurse on duty. Another possibility is that despite an assessment being

conducted, its accuracy is questionable, or the tool may not be appropriate for assessing risk in this specific context.

Furthermore, the planning and implementation of preventative measures when a risk was in fact identified may have been less than optimal, since certain patients identified as being at risk of falling because of confusion still fell unassisted. The patients mobilized on their own and did not call for assistance.

The data presented in this study indicate that most of the patients had a risk score lower than 5, which excluded them from fall-preventative measures. However, due to incorrect assessment of patients; poor record-keeping; inaccurate recording of findings, and the fact that risks were not acted upon timeously, falls occurred. At neither of the two hospitals any signage or identification that patients were at risk of falling was evident; such information was only shared upon handover from shift to shift.

In their study, Dykes *et al.* (2009:6) stated that the fall-assessment tool is both necessary and important in fall prevention. However, this becomes insignificant if the findings of an assessment are not communicated to all staff, and no individual care plan is devised for a patient at risk.

In their study of falls in the Emergency department, Berry, Naqvi, Johnson, Montgomery, Donegan, Willis and Zeplin (2018:39) found that a total of 53 patients fell and the mean age was 52 years. From these falls, 39 patients or 73.6% had a fall risk assessment completed and 24 (61.5%) of them were notified as fall risks. Thirteen of these patients received intravenous sedatives. Although this setting was an Emergency Department, the findings corresponds with the current study done that despite completing risk assessments, patients may still fall.

In their comparison of the Hendrich II, Morse and Johns Hopkins tool assessment tools, Feil and Gardner (2012:73) emphasized the importance of using assessment tools to prevent or identify high-risk patients. Such assessments should be completed and then a comprehensive fall-prevention plan should be compiled together with the standard nursing care plan. Furthermore, Dykes *et al.* (2009:1) reiterated that for any fall-risk prevention strategy to be successful, a proper risk assessment should be performed, and interventions personalized for each individual. Everyone caring for a particular patient should be informed and signage should to be clearly visible. This objective has been achieved. Failure to conduct adequate risk assessment by completion of the assessment tools as well as the lack of interpretation thereof, can lead to an increase in the hospital fall rate.

5.3 LIMITATIONS OF THE STUDY

A limitation of the study was the small sample size since only two hospitals from the same hospital group were involved in the project. There was no comparison group with which findings could be compared. Therefore, cause and effect could not be established. The researcher's time constraints prevented the inclusion of other hospital groups in the study and delimited the data-collection process to a retrospective documentation audit.

As a result of the unavailability of certain records as mentioned in Chapter 3, not all the intended nursing documents could be audited. Incomplete nursing notes in patient folders as well as the fact that nursing staff had not completed the documents accurately made it difficult to extract data. The risk-assessment document as well as the treatment chart in many of the patient folders had not been adequately completed. To compensate for this shortcoming, the information required to complete the data-extraction form was obtained from incident reports and electronic documents created by the hospitals' quality assurance department after the falls had occurred.

5.4 CONCLUSIONS

The intrinsic factors that were identified in the study as contributing to patient falls were identified as age, hypertension, co-morbidities, and the use of benzodiazepines as a sedative.

The extrinsic factors included the skill mix of the staff and inappropriate use of bed rails. Although the skill mix accorded with the hospital acuity norms, the concern is that on average, only one registered nurse was on duty per shift in the general wards.

Only 5 (3.7%) patients sustained major injuries as a result of falling. If the assessments had been done according to protocol, the falls could have been prevented or the severity of the injury sustained reduced. It is also possible that inaccurate findings of the assessment process, incomplete assessments or failure by the registered nurse on duty to act appropriately to such matters might have contributed to the falls.

Referring to the research question, *"What are the factors influencing patient falls in a private hospital group in the Cape Metropole of the Western Cape?"* the data as presented in this study, answered the question.

5.5 RECOMMENDATIONS

The recommendations discussed below are based on the findings of this study and its conceptual framework. The structure of the framework includes the intrinsic and extrinsic factors that play a role in patient falls. Figure 5.1 is a summary of the recommendations.

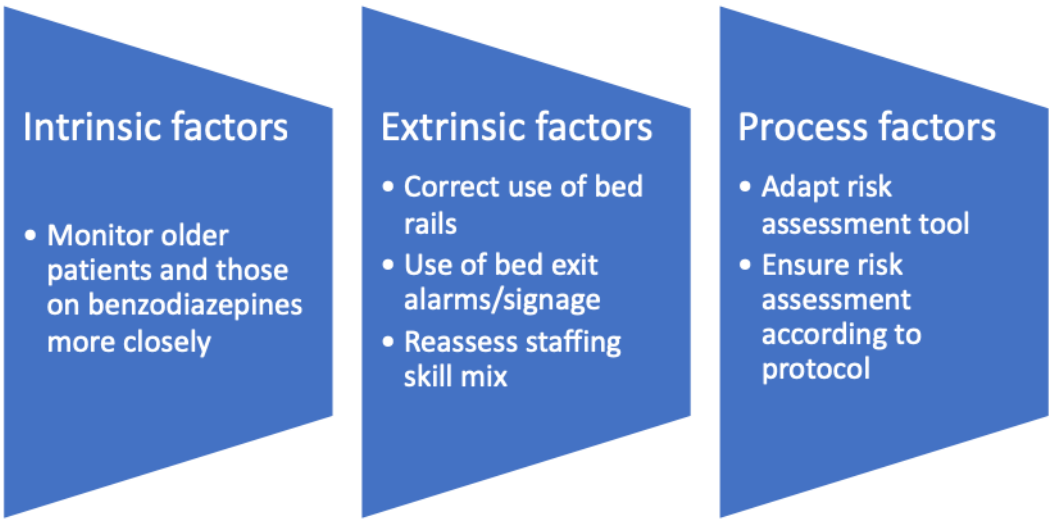


Figure 5.1: Summary of recommendations

5.5.1 Recommendation 1: Reconsider the use of Stillnox or increase the risk score for patients on benzodiazepines

The results of the study show that the sedative Stillnox was the predominant medication given to patients prior to falling. As discussed earlier (see section 5.2.1.7 above), side effects of this medication include a fall risk. Based on this, the recommendation would be to ascribe a higher risk factor to patients to whom this sedative is given. This should be a critical point on the assessment tool and automatically place a patient at risk. It should then be followed by the design of a comprehensive individualized fall-risk plan for each patient (Feil & Gardner, 2012:79).

5.5.2 Recommendation 2: Reconsider the staffing skill mix and registered nurse ratio's in the unit.

From the study it was apparent that the number of staff available at the time of the falls was adequate, although the skill mix norms were questionable. The staffing framework at the hospitals is not aligned to international benchmarking, namely having a higher proportion of registered nurses on duty per shift. It was evident that the workload exceeded what ideally could be expected from one registered nurse to successfully assess all the patients assigned

to her/him per shift. Accordingly, it is advised that the percentage of registered nurses be increased initially to at least 45%, and then gradually increased over a period of time that would be acceptable to the hospital group to a situation where at least 60–75% of nurses on duty per shift are registered nurses. This will then be aligned to international best practices as was discussed in Chapter 2, section 2.3.3 as well as in section 5.2.2.3 above (Aiken *et al.*, 2016:8).

5.5.3 Recommendation 3: Assess each patient need for the use of bed rails.

Bed rails were a contributing factor to the falls reported in this study in that several patients had climbed over the bed rails and then fell. Accordingly, it is recommended that beds be lowered to approximately 30cm from the floor so that patients will potentially not incur serious injuries should they fall. This will not prevent a fall however, but it should reduce the severity of possible injury. Some patients request that bed rails be raised to facilitate movement in bed. The recommendation would be to partially remove the bed rails and leave the upper portion of the bed rail in place (Hignett & Masud, 2007:609).

A practice not currently in place in the hospitals is positioning of bed-exit alarms on the beds. Once installed, the alarm will sound the moment patients lift themselves from the bed. This will alert the nursing staff and the patients can be assisted in time to prevent them from falling.

5.5.4 Recommendation 4: Enforce correct usage and application of the risk assessment tools.

The application of this tool in the current context of healthcare provision in the hospitals should be revised. It is recommended that an assessment tool be evaluated regularly, and its validity in an institution tested. The Hendrich II tool does not make provision for the age of patients or for previous falls. Since men are specifically mentioned in the tool, it is possible that women with a potential risk of falling might be overlooked. According to the demographic profile of the cases in this study, the abovementioned is a deficiency in the assessment of patients (Hendrich, 2006:1-4). The current tool should, therefore, be adapted or replaced with another evidenced-based tool that includes risks emanating from the hospital environment.

Furthermore, the outcomes of the assessments as performed by registered nurses should be interpreted and acted upon. This is in accordance with recommendations concerning changes to the skill mix mentioned previously (see section 5.2.2.3 above), specifically an increase in the number of registered nurses to interpret the assessments, as well as the total patient profile in order to reduce the risk of patients falling. Ongoing training of nursing staff

regarding the importance of the fall-risk assessment tool and its correct interpretation is necessary.

Use of clear signage to indicate that particular patients are at risk of falling is regarded as a necessary prevention strategy. To identify high-risk patients, such signs could include wearing color non-slip socks or clearly visible identification bands (Hignett & Masud, 2007:610). All employees in the hospitals, including non-nursing staff, could be trained or instructed to recognize the signage of high-risk patients.

5.5.5 Future research

The following are proposed as areas for future research:

- A similar study that includes more hospitals to ensure a larger sample, as well as the inclusion of a control group to compare findings and prospective data collection to ensure accurate recording of data
- Regular revision of policies regarding the fall-risk assessment tools, together with a follow-up study to determine improvements in the use of assessment tools, and
- A comparative study to determine the effect of the current skill mix of the hospital group on the sensitive quality outcomes of patients.

5.5 DISSEMINATION

The results of this study as well as its recommendations will be made available to both the hospitals. A copy of the study will be published by the University of Stellenbosch, and research findings could be used for an article for publication in a peer-reviewed journal. The study and findings will be presented at conferences and symposiums.

5.6 CONCLUSION

This study provided information on a number of patients who fell over a 17-month period in two specific hospitals in the Western Cape. The intrinsic and extrinsic factors that played a role in the falls were examined and appropriate findings were forthcoming. Patient falls in hospital remained a concern as regards patient safety. The lack of accurate and consistent patient assessments; use of benzodiazepines as a sedative, and the staff skill mix, as identified in this study, were contributors to the fall rate in the two hospitals. Consequently, further studies are recommended to address the factors involved and to substantially reduce the number of patients falls in hospitals.

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APPENDICES

APPENDIX 1: ETHICAL APPROVAL FROM STELLENBOSCH UNIVERSITY

UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

Health Research Ethics Committee (HREC)

Approval Notice

New Application

13/06/2018

Project ID :7210

HREC Reference # S18/05/097

Title: Factors influencing patient falls in private hospitals in the Cape Metropole of the Western Cape

Dear Mrs Renee Janse van Rensburg

The **New Application** received on 14/05/2018 14:10 was reviewed by members of **Health Research Ethics Committee** via **expedited** review procedures on 13/06/2018 and was approved.

Please note the following information about your approved research protocol:

Protocol Approval Period: **This project has approval for 12 months from the date of this letter.**

Please remember to use your project **ID (7210)**on any documents or correspondence with the HREC concerning your research protocol.

Please note that the HREC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review

Translation of the informed consent document(s) to the language(s) applicable to your study participants should now be submitted to the HREC.

Please note you can submit your progress report through the online ethics application process, available at: Links Application Form Direct Link and the application should be submitted to the HREC before the year has expired. Please see *Forms and Instructions* on our HREC website (www.sun.ac.za/healthresearchethics) for guidance on how to submit a progress report.

The HREC will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly for an external audit.

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Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility, permission must still be obtained from the relevant authorities (Western Cape Departement of Health and/or City Health) to conduct the research as stated in the protocol. Please consult the Western Cape Government website for access to the online Health Research Approval Process, see: https://www.westerncape.gov.za/general-publication/health-research-approval-process. Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.

For standard HREC forms and instructions, please visit: Forms and Instructions on our HREC website https://applyethics.sun.ac.za/ProjectView/Index/7210

If you have any questions or need further assistance, please contact the HREC office at 021 938 9677.

Yours sincerely,

Mr. Franklin Weber

HREC Coordinator

National Health Research Ethics Council (NHREC) Registration Number:

APPENDIX 2: PERMISSION OBTAINED FROM INSTITUTION

Initial Approval Letter

[redacted]

No.20180706

National Health Research Ethics Committee registration. **REC 251015-048**

26th July 2018

Mrs Renee Janse van Rensburg
University of Western Cape

Dear Mrs Janse van Rensburg

RE: APPLICATION TO CONDUCT RESEARCH: [redacted] HOSPITAL

Title of study: Factors influencing patient falls in private hospitals in the Cape Metropole of the Western Cape

The Research Ethics Committee of [redacted] hereby grants permission with no conditions for your study to be conducted at [redacted].
Present this letter to the Hospital Manager of the facility to gain permission at hospital level. This approval is valid for the period of the study.

Terms and Conditions:

1. If patient or institutional confidentiality is breached, [redacted] is entitled to withdraw this permission immediately. The Higher Education institution/Research Institution under which the research is taking place will be notified, and [redacted] reserves the right to take legal action against you, should the company feel that this is warranted.
2. An electronic copy of the research report (except in clinical trials) must be submitted to the [redacted] Research Ethics Committee prior to publication.
3. No direct reference may be made to [redacted] its subsidiaries or any of its facilities or institutions in the research report or any publications thereafter. The Company and its facilities, patients and staff must be de-identified in the study, and remain so for any other studies which may utilise this information.
4. The research must be completed within the time allotted by the Higher Education Institution/Research Institution. If the research is being done in an individual capacity by an employee of the [redacted], the research must be conducted within one year of permission being given by the Company, OR the proposed time period must be specified in the proposal, and approved. Permission may be withdrawn if the research extends beyond the approved time period.

5. The researcher must provide the Company with an interim report on the progress of the study every six months for the duration of the study.

6. [redacted] will not take responsibility for any unforeseen circumstances within its institutions which may materially change the context and potential outcomes of a student's research. Should this occur, the researcher will be required to approach their Higher Education Institution/Research Institution for guidance around alternative sites.

7. The researcher must provide a copy of the electronic research report or publications for placement on the Company's research register.

8. [redacted] will not be liable for any costs incurred during or related to this study.

[redacted]

[redacted]

On behalf of the Research Ethics Committee

Corrected Permission Letter
No. 20180706
National Health Research Ethics Committee registration: REC 251015-048
24th January 2019

[redacted]

No. 20180706

National Health Research Ethics Committee registration: **REC 251015-048**

24thJanuary 2019

Mrs Renee Janse van Rensburg
University ofStellenbosch

Dear Mrs Janse van Rensburg

RE: APPLICATION TO CONDUCT RESEARCH: [redacted] HOSPITAL & [redacted] HOSPITAL

Title of study: Factors influencing patient falls in private hospitals in the Cape Metropole of the Western Cape

The Research Ethics Committee of [redacted] hereby grants permission with no conditions for your study to be conducted at [redacted] Hospital and [redacted] Hospital.
Present this letter to the Hospital Manager of the facility to gain permission at hospital level. This approval is valid for the period of the study.

Terms and Conditions:

1. If patient or institutional confidentiality is breached, [redacted] is entitled to withdraw this perm1ss1on immediately. The Higher Education institution/Research Institution under which the research is taking place will be notified, and [redacted]e reserves the right to take legal action against you, should the company feel that this is **warranted.**

2. An electronic copy of the research report (except in clinical trials) must be submitted to the [redacted] Research Ethics Committee prior to publication.

3. No direct reference may be made to [redacted], its subsidiaries or any of its facilities or institutions in the research report or any publications thereafter. The Company and its facilities, patients and staff must be de-identified in the study, and remain so for any other studies which may utilise this information.

4. The research must be completed within the time allotted by the Higher Education Institution/Research Institution. If the research is being done in an individual capacity by an employee of the [redacted], the research must be conducted within one year of permission being given by the Company, OR the proposed time period must be specified in the proposal, and approved. Permission may be withdrawn if the research extends beyond the approved time period.

5. The researcher must provide the Company with an interim report on the progress of the study every six months for the duration of the study.
6. [redacted] will not take responsibility for any unforeseen circumstances within its institutions which may materially change the context and potential outcomes of a student's research. Should this occur, the researcher will be required to approach their Higher Education Institution/Research Institution for guidance around alternative sites.
7. The researcher must provide a copy of the electronic research report or publications for placement on the Company's research register.
8. [redacted] will not be liable for any costs incurred during or related to this study.

[redacted]

Yours sincerely,

[redacted]

On behalf of the Research Ethics Committee

Hospital A:

From: Renee Janse van Rensburg [mailto:1965rjvr@gmail.com]
Sent: 11 July 2018 01:17 PM
To: XXXXXXXXXX
Cc: XXXXXXXXX
Subject: Permission to perform a retrospective record audit.

Dear Ms XXXXXXX

I am currently enrolled with the University of Stellenbosch studying towards a master's degree. I hereby wish to ask permission to perform a retrospective documentation audit on the folders for the time frame October 2016 - February 2018 relating only to the folders of patient that fell in hospital. I attach the proposal and ethical approval from the University of Stellenbosch for your perusal. I have had a discussion with Dr XXXXXXXXX, earlier today, XXXXXXXXX will only be able to give the formal approval after the 26th of July 2018. However she indicated that she is comfortable for me to approach you for permission to access the records prior to this time.
Regards
Renee Janse van Rensburg

On Wed, 11 Jul 2018 at 20:10, XXXXXXXXXX<XXXXXX@XXXXXX.co.za> wrote:

Dear Renee
Permission granted. Please contact XXXXXXXXX with regards to the files you need. I will advise the nursing Management that approval has been granted.
All the best

XXXXXXXXXXXXX

Hospital Manager

Hospital B:

From: Renee Janse van Rensburg [mailto:1965rjvr@gmail.com]

Sent: Wednesday, 11 July 2018 1:13 PM

To: XXXXXXXX< XXXXXXXXXXXX@lXXXXXXXXXXXXXX.co.za>

Cc: XXXXXXXXX< XXXXXXX@XXXXXXXXXXe.co.za>; XXXXXXXXXX< @XXXXXXXXX.co.za>

Subject: Permission to perform a retrospective record audit.

Dear Mrs XXXXXXXXXXX

I am currently enrolled with the University of Stellenbosch studying towards a master's degree. I hereby wish to ask permission to perform a retrospective documentation audit on the folders for the time frame October 2016 - February 2018 relating only to the folders of patient that fell in hospital.
I attach the proposal and ethical approval from the University of Stellenbosch for your perusal.
I have had a discussion with Dr XXXXXXX, earlier today, XXXXXXX will only be able to give the formal approval after the 26th of July 2018. However she indicated that she is comfortable for me to approach you for permission to access the records prior to this time.
Regards
Renee Janse van Rensburg
082 828 8660

From: XXXXXXX< XXXXXXXXXX@XXXXXXXXXX.co.za>
Date: Mon, 16 Jul 2018 at 18:01
Subject: RE: Permission to perform a retrospective record audit.
To: Renee Janse van Rensburg <1965rjvr@gmail.com>
Cc: XXXXXXXXX< XXXXXXXXXX@XXXXXXXXXX.co.za <XXXXXXXXX@XXXXXX.co.za>

Hi Renee

Thank you for your email.
We will be happy to grant permission in the interim while waiting for official approval.
Would you please share your findings and paper with us when completed?

Kind regards XXXXXXXXXXXXXX
Hospital Manager

APPENDIX 3: DATA EXTRACTION FORM

Instrument for data extraction

Reference number: Click or tap here to enter text.

Admission date: Click or tap to enter a date.

1. **Intrinsic factors**

1.1 Age: Click or tap here to enter text.

1.2 Gender: ☐Male ☐Female

1.3 Diagnosis: Click or tap here to enter text.

1.4 Co-Morbidities: Click or tap here to enter text.

1.5 History of previous falls: ☐Yes ☐No

1.6 Patient mobility: ☐Independent ☐With assistance ☐Immobile

1.7 Patient acuity: ☐Minor ☐Moderate ☐Major

1.8 Urinary irregularities:

1.8.1 Frequency: ☐Yes ☐No

1.8.2 Incontinence: ☐Yes ☐No

1.8.3 Catheterization ☐Yes ☐No

1.9 Mental state disorder: ☐Yes ☐No

1.10 Visual disturbance: ☐Yes ☐No

1.11 Hearing disturbance: ☐Yes ☐No

1.12 Musculoskeletal disorder: ☐Yes ☐No

1.13 Blood pressure: ☐Hypertension ☐Hypotension

1.14 Benzodiazepine: ☐Yes ☐No

1.14.1 Time of last administration before fall: Click or tap here to enter text.

1.15 Anti-Epileptics: ☐Yes ☐No

1.15.1 Time of last administration before fall: Click or tap here to enter text.

1.16 Any other medications that could suppress the central nervous system taken prior to the fall? ☐Yes ☐No

1.16.1 What medication? Click or tap here to enter text.

1.16.2 Time of last dose taken? Click or tap here to enter text.

2. Extrinsic factors:

2.1 Was furniture/ equipment a causative factor in fall? ☐Yes ☐No

2.2 Environmental factors:

2.2.1 Uneven or wet floor: ☐Yes ☐No

2.2.2 Height of toilet seat: ☐Yes ☐No

2.2.3 Did patient use assistance device? ☐Yes ☐No

2.2.4 Was the call bell at hand ☐Yes ☐No

2.2.5 Was the bed rails pulled up? ☐Applicable ☐Not Applicable

2.3 Where did the fall occur? Click or tap here to enter text.

2.4 Were shoes or loose clothes (Socks) a causative factor? ☐Yes ☐No

2.5 Number of staff on shift at time of fall:

Registered Nurse		Enrolled Nurse		Enrolled Nursing Auxiliary		Careworker	

2.6 Was staffing skill mix according to the estimated norm of the company?

☐Yes ☐No

2.7 **Unit discipline**:

2.7.1 ☐Medical unit

2.7.2 ☐Surgical unit

2.7.3 ☐Neuro/cardiovascular unit

2.7.4 ☐Orthopaedic unit

2.7.5 ☐Paediatric unit

2.7.6 ☐Intensive Care Unit

2.7.7 ☐Other:

2.8 Number of beds in the unit:Click or tap here to enter text.

2.9 Occupancy at time of fall: Click or tap here to enter text.

3. Patient fall:

3.1 Time of fall: Click or tap here to enter text.

3.2 Type of fall: ☐Assisted ☐Unassisted

3.3 Injuries: ☐Yes ☐No

3.4 Type of injury:

☐None	☐Minor	☐Moderate	☐Major	☐Death

3.6 Increased length of stay due to fall (calculated according to the normal length of stay for admission diagnosis compared to actual length of stay after the fall):

☐Yes ☐No

3.7 Hendrich assessment recorded at admission: ☐Yes ☐No

3.8 Recorded score calculated as per the assessment tool: Click or tap here to enter text.

3.9 Last Hendrich assessment recorded prior to fall:

Time:Click or tap here to enter text. Score: Click or tap here to enter text.

3.10 Other factors not mentioned: Click or tap here to enter text.

APPENDIX 4: DECLARATIONS BY LANGUAGE AND TECHNICAL EDITORS

PO BOX 210
HERMANUS
7200

Stephne1@telkomsa.net

17 November 2018

DECLARATION BY LANGUAGE EDITOR

TO WHOM IT MAY CONCERN

This serves to confirm that I have completed the editing of the Masters' dissertation, *Factors influencing patient falls in private hospitals in the Cape Metropole of the Western Cape* by Ms R Janse van Rensburg.

The editing process, which was intended to produce as correct, consistent and complete a report as possible, entailed the following:

- Checking grammar, spelling, punctuation and style to ensure concise and clear formulation
- Identification of repetition and overlap in information
- Inclusion of cross references where appropriate.

Where deemed necessary, the candidate's attention was drawn to issues that required additional consideration or which warranted the attention of her supervisors.

All the necessary changes were made to the manuscript.

Stephné Herselman

Professor Emeritus
Department of Anthropology and Archaeology
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Lize Vorster Communication

To whom it may concern

This letter serves as confirmation that I, Lize Vorster, performed the language editing and technical formatting of Reneé Janse van Rensburg's thesis entitled:

Factors influencing patient falls in private hospitals in the Cape Metropole of the Western Cape.

Editing is done in track changes and the student has final control over accepting or rejecting changes at their own discretion. Technical formatting entails complying with the Stellenbosch University's technical requirements for theses and dissertations, as presented in the Calendar Part 1 – General or where relevant, the requirements of the department.

Yours sincerely

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